Rock Products

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Washing Organic Matter from Sand

Plant of the Premier Sand and Gravel Company Almost Doubles the Strength of Concrete by Thoroughly Washing Sand Free from Organic Bearing Dirt and Silt

A PROBLEM which is especially important to sand and gravel producers in some parts of the South is that of ridding the sand of organic matter. The silt which is found with this sand carries so much decayed vegetable matter, and the products of decay, that a very little of it will render the sand unfit for concrete aggregate. In extreme cases, test pieces made from sand of this sort (unwashed) would crumble in the fingers after standing for 28 days.

Regarding the effect of organic matter, a recent authority, Mills' Materials of Construction, says: "Dirt in sand is dangerous in proportion to the amount of organic matter present, so little as 0.1 per cent having been found injurious."

The Premier Sand and Gravel Co. of Birmingham, Ala., found at the outset that the sand from the pit which they proposed to work contained sufficient organic matter to seriously affect the strength of the concrete made from it. They consequently studied the matter thoroughly and found that a thorough washing would remove the deleterious substances along with the small amount of silt which was present. The unwashed sand appeared quite clean to the eye and the silt was only 2.5 per cent, which is a lower silt content than that required by most state highway specifications (3 per cent). The ordinary observer would have pronounced it "clean" sand and quite fit for concrete purposes.

(Parenthetically, one may remark that it is on sands of this character that the colorometric test is of real value as indicating the suitability of sand for making concrete, although even with such sands it is an indication rather than a proof of their unsuitability, and the colormetric test alone should not be relied upon. Strength tests should always be made wherever this is possible.)

But the returns from the Pittsburgh testing laboratory showed very plainly that even this small amount of silt had a remarkable effect on the concrete strength. These were:

REPORT OF PITTSBURGH TESTING LABORATORY ON SAND FROM PREMIER SAND AND GRAVEL CO.

	Standard Ottawa sand	Premier unwashed sand	Premier washed sand
Silt by elutriation....	None	2.5%	None
Strength ratio	100%	87%	131.6%
		131.6%	
		87.0%	
Loss in strength by use of unwashed sand		44.6%	

In effect, these tests showed that the strength of the concrete was *practically doubled* by thoroughly washing the sand.

The Premier Sand and Gravel Co.'s plant and the excavation. The picture gives an excellent idea of cableway drag line working in a deep deposit. About 25 ft. is above water and 30 ft. below, with 6 ft. of red clay overburden, which has to be stripped

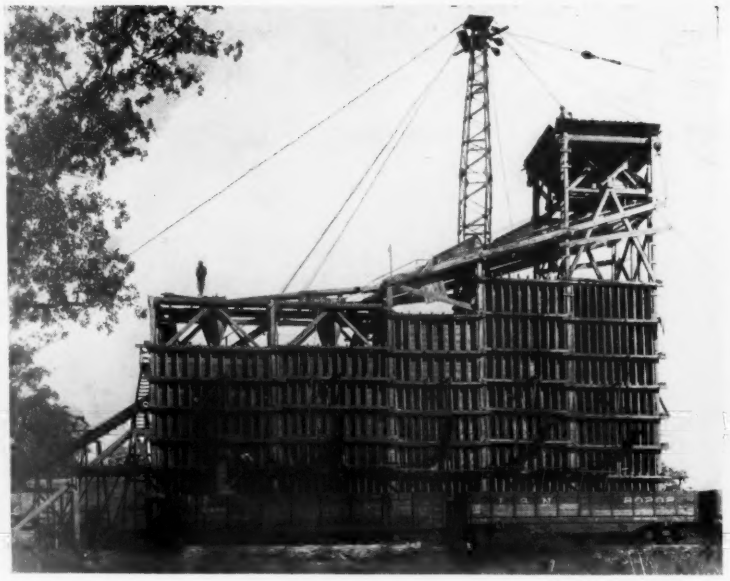
The plant of the Premier company is located at Jackson's Lake, about five miles north of Montgomery, Ala., on the L. & N. railroad. This is in what is perhaps the greatest sand and gravel producing district of the United States. There are seven good sized plants operating at Jackson's Lake and Prattville Junction besides a county-owned pit, according to a recent issue of the *Dixie Manufacturer*. The Premier company is a subsidiary of the Birmingham Slag Co. and W. H. Brooks is in charge of the sand department of this company.

There are 100 acres in the company's property. The deposit is of the alluvial type formed by the erosion of the surrounding hills, from which the sand and gravel has been washed by heavy rains and creek flows on to a broad plain from Chehaw to a point west of Montgomery. A view of this plain and the plant is given in one of the accompanying pictures. As would be expected from the nature of the deposit, a considerable overburden has been formed. On this particular property it consists of a 6-ft. depth of the red clay familiar to travelers on the southern railroads, since it shows in so many railroad cuts. This overburden has to be removed before the sand and gravel is extracted.

The sand and gravel averages 55 ft. in depth, and the lower 30 ft. is below normal water level. Above the water level, 85 per cent of the deposit is sand, but the ratio changes as the water level is reached so that the gravel is increased from 15 to 40 per cent of the whole. No gravel has been

found greater than 3 in. in diameter.

Sauerman cableway draglines are used for removing the red clay overburden and for extracting the sand and gravel. This is an exceptionally good installation of this type of excavator. The tower is of steel 102 ft. high; the car end of the track line is carried on the usual bridle to permit easily shifting the course of the bucket. The whole arrangement is very clearly shown in the photograph of the pit and plant. The track line is a 1⅜-in. cable, the load line and the tension lines are ⅞-in. and ¾-in. respectively.



The dragline tower is of steel 102 ft. high and the bucket dumps into the receiving hopper and goes directly to the screens and sand separators, which are of a type in common use. The unusual feature of the plant is not in the equipment but the thoroughness of the washing

The washing plant is of what might be called the standard Link-Belt design as applied to a cableway dragline operation. The receiving hopper takes the bank material from the bucket and delivers it to the first screen. There is no need of a scrubber (the silt being small in amount and not adhering closely to the grains and pebbles). But there is a very thorough mixing of the sand and gravel with the water applied at the first screen, as shown in the picture on the next page.

The screen line has three conical screens, each 8 ft. long, of the familiar Dull (Link-Belt) pattern. The first screen has 1¾ in., the second ⅞-in. and the third (sand screen) ¼-in. perforations. There are two Dull cones used for settling the sand, with the usual launder screen for taking out the fine sand. The bins are of timber construction with exceptionally good bracing and tying. No special arrangements are provided for moving cars, these being run into and out of the loading points by gravity. Storage tracks for both full and empty cars are long enough to hold a day's supply.

The company appreciates fully the importance of educating the buyers of sand in the importance of cleanliness of the sand from this particular district, and it issues a folder which is so informative and such a model of what sand advertising ought to be that the text is given here:

"The following is quoted from 'Recent Development in Concrete,' by R. C. Boyden of the Portland Cement Association:

"'The laboratory studies have brought out two important facts regarding sands. One of these is the great importance of being sure that the material is clean, not only in appearance but in fact. Very often sand which appears to the eye to be clean contains enough humus or vegetable matter to reduce the strength considerably.'

"Although our sand at Jackson's Lake, Ala., is a good looking bank-run sand, we decided to test it for impurities and at the

"Airplane" view of plant and deposit. The deposit is one of a number located in the section near Montgomery, Ala., in what is one of the largest sand and gravel producing sections in the United States

The screen line and launder which leads to the sand separators

guaranteé all grades entirely free from any foreign matter which is injurious to concrete. Then after considering quality compare our prices with those of 1914.

"We will be glad to send copies of Pittsburgh Testing Laboratory on this test to those interested in BETTER CONCRETE."

The publication of such an advertisement is an evidence of the praiseworthy efforts now being made by sand and gravel producers everywhere throughout the United States to educate the public as to the value of clean aggregate. Washed sand today is a manufactured product.

Cars are loaded by the usual gate and counterweighted chute

Close-up view of the excavation, showing bucket just starting in with its load

same time compare it with our sand after being washed and graded by our modern plant. Two concrete blocks have been made, one with our washed sand and the other with our bank-run unwashed sand, which we found by test contained 2.5 per cent vegetable matter. These two blocks were then submitted to a crushing test and the strength of each under pressure was recorded. The results, as shown by laboratory reports, show a surprising difference i nstrength.

"The unwashed sand, which looked as clean as the washed sand, only showed a strength of 87 per cent, which is due to the 2.5 per cent of vegetable matter contained therein, while the washed sand showed a strength of 131.6 per cent, which is unusually high and due to the fact that not even a trace of vegetable matter was found in the sand. Therefore we have found that our unwashed sand containing just a small amount of vegetable matter reduced the strength of the concrete 44.6 per cent. Ottawa Standard Sand is taken as 100 per cent.

"Why take the above chances when sand of the quality produced by our plant is available? We produce only a washed sand and

The bank sand is merely the raw material. Usually not only dirt and silt have to be discarded but a part of the sand itself, in some cases amounting to 25 per cent has often to be thrown away in order to give the sand the proper grading. In fact there are few materials that are bought and sold on closer specifications than the concrete sand that is used for highway work.

As quality is the strong selling point of the sand produced by this company, tests are constantly made to assure that the production is kept up to the mark. A report of one of these tests is given here not so much for its value in connection with a description of this plant as because it is an excellent example of what a good concrete sand should be.

MECHANICAL ANALYSIS

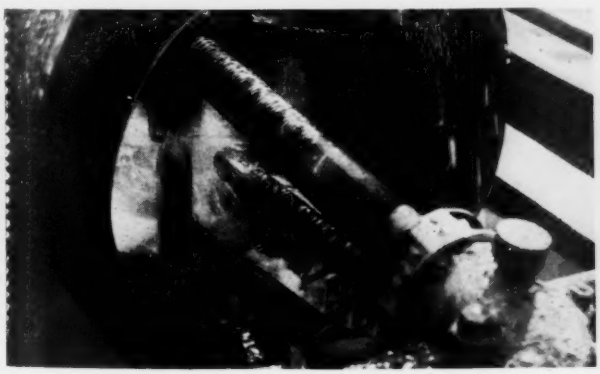
Passing sieve number	Ret. on sieve number	Per cent
2	4	1.3
4	10	3.7
10	20	20.0
20	30	30.7
30	40	21.1
40	50	13.3
50	80	4.0
80	100	0.3
100	200	0.3
200	.....	0.3
Silt by elutriation		0.0
		100.0

Voids, 28.6%.

COMPARISON WITH STANDARD OTTAWA

Seven-Day Tests

—Tensile— Sand	Ottawa		Compression— lbs. per sq. in. Sand	Ottawa
367	250		2673	2021
334	240		2957	2005
320	270		2387	2117
340	253	—Average—	2672	2048
Strength ratio: 134.4%			Strength ratio: 130.5%	



Left, the first screen, which serves as a scrubber, showing how the water is admitted. Right, the six-inch centrifugal pump, which supplies the water for washing

More West Coast Jottings

Central California No Laggard in Rock Products Development

By Nathan C. Rockwood
Editor and Manager, Rock Products

PORTLAND, Ore., Oct. 14.—Of course I did not find as much activity in the rock products industries from Fresno to San Francisco as I found in the vicinity of Los Angeles, for even San Francisco people have to acknowledge that Los Angeles is a wonder. However, Los Angeles conditions are more or less typical of the whole coast region so far as I have covered it.

A sand and gravel or crushed stone producer from the East would certainly wonder how a city and locality of 75,000 population, like Fresno, could support three very live plants—one a quarry and the other gravel plants, producing about 6000 tons per day. Yet all three are busy and a new one is contemplated. There is a lot of engineering construction, like hydroelectric power plants, in prospect, the railways are doing considerable improvement work, and a little highway work is under way.

Fresno is the heart of the fruit country, more especially grapes, the home of the "Sun Maid" raisins, and this year is a year of abundance, but very low prices. Also there have been early rains which threaten the ruination of both raisin and fig crops. A $4,000,000 country road building program has just been completed and there appears to be considerable doubt as to how soon the county will start in again.

Gold a Byproduct of Sand and Gravel

The most interesting phase of the sand and gravel industry in this vicinity is the recovery of gold dust as a byproduct. One large plant, producing 40 to 50 cars of sand and gravel a day of washed bank gravel, recovers gold to the amount of $500 to $2000 a month, depending somewhat on the depth at which the steam shovel is operating. The deposit is an old river gravel carrying possibly 4 to 5 c. per cubic yard in gold—not sufficient to be attractive as a gold-mining proposition, but certainly very nice "velvet" for a sand and gravel operator.

In all probability many Western river gravels, and possibly sand and gravel in other states like North Carolina, where gold is known to occur, contain appreciable amounts of gold dust, when considered, as a byproduct in treating 2000 to 3000 tons of material a day. (I have been told Wisconsin gravels occasionally have diamonds.) The process of gold recovery is very simple and any sand and gravel plant could be designed to make such recovery at slight additional cost.

Three New Cement Plants

Above Fresno, on the Southern Pacific railway, is Merced, where the Yosemite Portland Cement Co. is constructing a new cement plant, concerning which we have had a number of news items already. This is in a territory now reached by the plants near Los Angeles and San Francisco, and where undoubtedly much development will take place in the near future in hydroelectric and irrigation work construction.

Two other portland cement plants in San Francisco territory are contemplated. One is to be the first oyster-shell plant on the coast, in fact the second such plant in the United States (the other being at Houston, Texas). It will be on San Francisco bay and offer very unusual opportunity for water shipments along the whole coast. This is the project of the Pacific Portland Cement Co. It will be a 2500-bbl. wet-process plant, but as yet the company will make no definite announcement as to when construction work will begin. J. C. Buckbee, of the J. C. Buckbee Co., Chicago, has been retained as consulting engineer.

The other cement plant project is that of the Guadalupe Portland Cement Co., which has acquired property near San José, on the west side of the mountains from Merced, and is now in the process of financing. P. S. Taylor, a well-known cement expert, formerly superintendent of the Victorville plant of the Southwestern Portland Cement Co., is general manager and chief engineer.

Lime and Gypsum

The most interesting feature of the lime industry in the San Francisco district—at least the most interesting to me—was the discovery of a little kiln at the plant of the California Chemical Spray Co., Watsonville. It is a tiny one, producing only about 2 tons per 24 hr., but is about the only one in the vicinity burning oil in four furnaces and operated as a draw kiln. Limestone is shipped to this kiln from the quarry of the Pacific Portland Cement Co. west of Auburn, about 225 miles distant by rail, and costs put down at Watsonville about $5 per ton. Yet this plant is able to make lime at the rate of 2 tons or less per day in competition, both as to price and quality, with lime made by local lime plants!

Most of the limestone near the coast is of a very coarse crystalline structure and is burned in shaft kilns only when they are operated as intermittent pot kilns. This is because the lime crumbles badly in the kiln and chokes the draft. It does not appear that any one has ever given much research to the problems of burning this limestone satisfactorily and of making a satisfactory hydrate of the resulting lime. The Auburn limestone is a finer grained stone, a very pure calcium carbonate, and is more easily handled.

There are deposits of both high calcium and high magnesium limestones near Sonora and the Pacific Lime and Plaster Co. is contemplating construction of a hydrating plant there and putting a magnesium-lime finishing hydrate on the coast markets. This company is partly owned by the Atlas Mixed Mortar Co. of San Francisco, which has met with remarkable success in reinstating lime plaster in San Francisco and vicinity.

Gypsum Producers Not Asleep

Gypsum producers are not asleep, however, for the Pacific Portland Cement Co., Consolidated, is just completing one of the most modern gypsum plaster mills in the world at Gerlach, Nev. It has been operating at the plant at Mound House, Nev., for many years. The gypsum rock will be quarried with a revolving electric shovel and brought to the mill by an aerial tramway. The calcining plant will consist of six 10x10 kettles. In addition to plaster of all kinds, the new plant will manufacture partition tile, Keene's cement and wall board.

Concrete Aggregate Situation in San Francisco

The largest producer of concrete aggregates and crushed stone in the San Francisco territory is the Coast Rock and Gravel Co. This company now operates the boulder-crushing plants of the Natormas Co., a quarry, and two or three sand and gravel plants. A new gravel plant, possibly the largest of its type in the world, is now under construction at Eliot. It will be a cableway excavator plant having a digging bucket of 5-cu. yd. capacity, operated at a traveling speed of 1000 ft. per minute by a 300-hp. elecrtic motor. This huge bucket was especially designed for its work by the general superintendent of the company, Mr. Hadsel.

The Pratt Building Materials Co. of San

Francisco is also constructing a new boulder crushing plant, with a 24x36 initial jaw crusher, at Folsom, which is expected to be the last word in plants of this type—a type which seems to be peculiar to the West coast. Mr. Pratt, by the way, is the secretary of the local sand and gravel producers' association, which has been more or less dormant for some time past.

Convention Plans

I have spent considerable time and effort talking national convention to producers here on the coast; and the unusual opportunity of being able to attend both the crushed-stone and the sand and gravel meetings at St. Louis next January is making a strong appeal to them. A number have already promised to be there.

Crushed stone men will be interested in knowing that I have had a delightful visit with Frank W. Bilger, who attended the organization meeting of the National Crushed Stone Association in Chicago in February, 1918, and cheered the snow-bound delegates with his speech about the "land of sunshine and flowers." Mr. Bilger was out of the quarry game for a while, but is back again strong now as president of the Oakland Paving Co., Oakland, Calif.; and he promises to make every effort to get to St. Louis next January and renew old acquaintances.

Boosters for the Convention

Another earnest booster for the crushed-stone convention is A. R. Wilson, president of the Granite Rock Co., Watsonville, a director of the National Crushed Stone Association. He has a most interesting operation and plant, concerning which we shall have complete details in a subsequent issue. He is a native son of California, a civil engineering graduate of the Massachusetts Institute of Technology—and a prince of hosts. Later on he is going to try to find time to take his car and make the rounds of some of these California stone producers and get them to turn out for the St. Louis convention. Hope we can have a convention in San Francisco some day. A large attendance would be insured and every Eastern producer would find plenty to interest him in the production and marketing methods of the West Coast.

Unfortunately for my present trip I feel the urge to get back to Chicago and start work on the convention program. There is every indication we can make last year's convention look like a Sunday school picnic.

Builders' Supply Convention at New Orleans

THE Southeastern Builders Supply Association has definitely decided to hold its next convention in New Orleans, at the St. Charles Hotel, December 3, 4, and 5. William E. Law, 602 Consolidated building, Jacksonville, Fla., is executive secretary.

Missouri Highways Will Get Cement at Cost

Great Western Cement Co. Makes Liberal Offer to the State—Bids on Sand, Gravel and Stone

KANSAS CITY, Mo., Oct. 9.—(Special.)—After rejecting all bids for supplying cement which were opened September 28, the State Highway Commission late today voted to accept the offer made by William Volker, of Kansas City, to furnish 400,000 bbl. of cement a year at cost, for five years. Two conditions are attached to the acceptance of Volker's offer. One is that if freight rates are increased, Volker must bear the expense of the increase; the other that the commission will not pay more than 6 per cent for money on any indebtedness incurred in the transaction. Volker owns the Great Western Cement Co., which produces 1,200,000 bbl. a year. He has a market for two-thirds of the product and offers the state the other third without profit. It is estimated that his offer amounts to a donation of $160,000 a year or $800,000 for the five years of the agreement.

The offer by Volker does not affect his company's relations with rival cement makers, since he does not cut the price of cement but personally returns all profits, thus furnishing cement at actual cost.—*St. Louis Star.*

In reply to a letter from ROCK PRODUCTS regarding the bids of the Missouri State Highway Commission for sand, gravel and crushed stone, the following has been received, signed by Edwin S. Austin.

"For your information I will state that the commission has approved contract with the Old Monroe Gravel Co., of Old Monroe, for 25,000 tons of gravel at 35c. per ton f.o.b. plant. It has also approved contract with the Phoenix Stone Co., of Phoenix, Mo., for crushed stone at 90c. per ton.

"The chief engineer was instructed to readvertise for material in other parts of the state to supply future needs. This will, no doubt, be done in the near future."

Houston Will Buy Gravel by the Ton

Texas City Claims It Has Lost Heavily Through Sloppy Methods of Purchasing Road Material

NO more probes into gravel paving in Houston.

Such investigations cost too much. One now going on has cost upwards of $15,000.

As a result of charges made by W. R. Britton, street commissioner, that contractors had in some cases cheated the city out of an inch or two of gravel on streets, the whole plan of street graveling is to be changed. The city will hereafter buy gravel by the ton.

Contractors will be paid for the weight of gravel in incoming cars, weighed under city supervision. City inspectors will see that all that gravel goes on the street for which it is intended.

The old way—under which the present costly probe was precipitated—was for the city to let a contract for, say, an 8-in. gravel topping on a street. If only 5 or 6 in. were put down by the contractor, who furnished his own material, the city got "stung."

"We should have had the tonnage system all the time," said Mayor Holcombe after council meeting. "Hereafter there'll be no more question of cheating. We'll specify so many tons of gravel to be laid on so many blocks of street and see that we get what we pay for."

Gravel comes high in Houston, because there are no gravel beds within about 80 miles of the city.

The city's bill for gravel used and to be used this year would be about $108,000, the city engineer's office estimated.

Gravel costs $2.20 a cubic yard, of which 70 cents is for gravel and $1.50 for freight from Columbus, Glidden, Ledbetter and other pits in the Colorado river valley. Switching charges would add about 13 cents to this, but not all cars have to be switched. The average would be about $2.30 a yard, it is estimated.

That makes the gravel cost about $1.55 a ton, delivered at spur tracks from which the contractors' wagons load.

The city laid in 1921 a total of 196,622 sq. yd. of gravel or about 68,818 tons. In 1922 it applied only about 80,000 sq. yd., or about 28,000 tons. In 1923 it will lay about 200,000 sq. yd., or 70,000 tons, according to George L. Brown, paving engineer.—*Houston (Texas) Press.*

Gravel Industry Is Life-Saver for Arkansas Town

MR. S. L. PAYNE, of El Dorado, came to Delight about five months ago and started moving gravel on a small scale, with a payroll of $200 or $300 per week. It had increased until last week it was about $250 per day.

It has not reached the limit yet, as Mr. Payne has just about completed a gravel crusher, which will be in operation soon, and will demand more teams and men to supply the gravel for the crusher. The credit of Mr. Payne is, that he came to the rescue of the people of our town and community, and opened up this enterprise at a time when the people needed help worse than they ever had since the writer has known this place.

Since Mr. Payne began operations here five months ago, he has turned loose approximately $15,000 directly to the people of our town and community, and we as people ought to feel very grateful to him for ever coming to this place.—*Delight, Ark., Tribune.*

Producing 600 Tons Crushed Stone Per Day with Eight Men

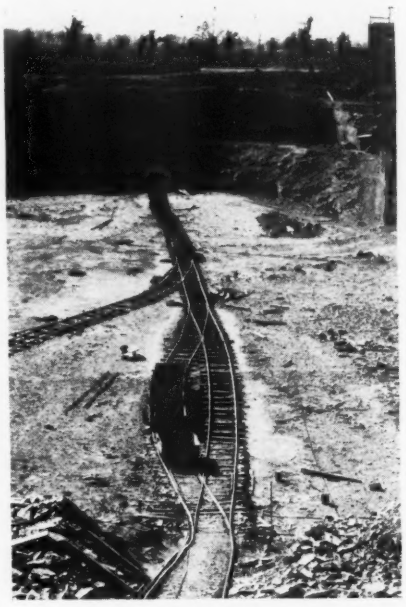
The Lutz Stone Co., Oshkosh, Wis., with Its New Plant Is Producing Crushed Stone Perhaps More Economically Than Any Other Company in the World—Five Men in Quarry and Three About Plant

By George M. Earnshaw

BEFORE taking me through the quarry and plant, Mr. Lutz told me that he was shipping from 550 to 650 tons of stone per day and I didn't attach any significance to the statement. But when we went to the quarry I couldn't refrain from asking, "Where are all your men today?" as I could only see three besides the shovel operator and locomotive driver.

"Why they're all here," Mr. Lutz replied, rather indignantly, "how many men do you think it takes to run this operation, anyway?" And after confessing that I didn't know, he told me very gently, *"Just eight."* But during the next three hours that I spent around the plant I saw for myself that the company does actually ship from 550 to 650 tons per day, using only eight men. These were located about the operation as follows: Shovel operator, gasoline locomotive driver, shovel helper, brakeman (who also repairs track and hooks cars), driller (who also does the blasting), hoist operator, plant operator, and a combination blacksmith and master mechanic.

A great part of this economy is made possible by the plant's design, one feature of which embodies a primary crusher of excess crushing capacity. This permits sending most of the stone to the crusher as quarried without diminishing the normal capacity of the plant if there are occasional "choke-ups." The normal capacity of the primary crusher is between two and three times the actual tonnage now being produced.



A spring switch at the bottom of the incline helps speed up the operation. Note locomotive house at end of track

The Quarry

The fact that the operation is as large as it is makes the accomplishment all the more remarkable. The property, which is within the city limits, consists of 100 acres, all of which has been tested and found to bear excellent limestone. The quarry is a big open pit, 500 ft. in diameter, east and west, and 800 ft. in diameter, north and south and is 52 ft. in depth on all sides with a perfectly flat floor.

At the present time the company is operating at the southeast side of the pit, making a minimum haul possible because the plant is located at the east side. All loading is done with one shovel—a Type O, Thew, electrically powered, crawler tread, equipped with a ¾-yd. bucket. This machine is the latest model and has only one 20-hp. motor, using 220 volt, alternating current. It is served by two tracks (all quarry trackage is of 56-lb. rail, standard gage) and two cars are brought in at a time, the locomotive leaving two empties and taking out two loads each trip to the shovel.

The company owns eight 4-yd., all-steel Kilbourne & Jacobs end-dump cars of

This panoramic view, with the view on the opposite page, which is a continuation, gives an idea of the size and proportions of the Lutz quarry

General view of plant showing "crusher sand" storage in foreground at left; extreme right, one of the contractors' loading outfits

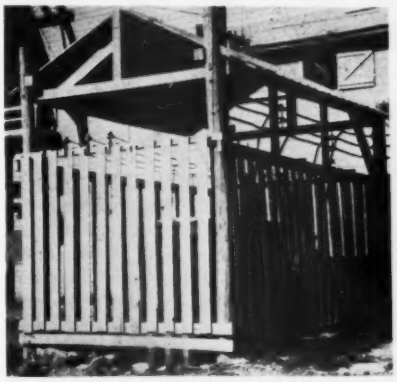
special design equipped with Hyatt roller bearings. The locomotive—an Adamson, manufactured by the Adamson Motor Co., Birmingham—is one of the first of its kind to be used in the rock products industry. It is merely a Fordson tractor mounted on a set of car wheels and uses either gasoline or kerosene for fuel. Its consumption of kerosene averages from 9 to 10 gal. per day.

Drilling

So far, the company has found it to be more economical to have its big blast-hole drilling done by a local well-drill contractor, inasmuch as it has secured an unusually low rate per foot. It is the plan, however, to purchase an electric well-drilling outfit next year. Secondary, or pop-hole, drilling is done by Ingersoll-Rand Jackhamers. Air is furnished by a Type ER-1 Ingersoll-Rand compressor, driven by a 30-hp. motor. The air line, as well as the conduit from the plant to the shovel is layed alongside the incline under cover of the track.

Incline and Dumping Arrangement

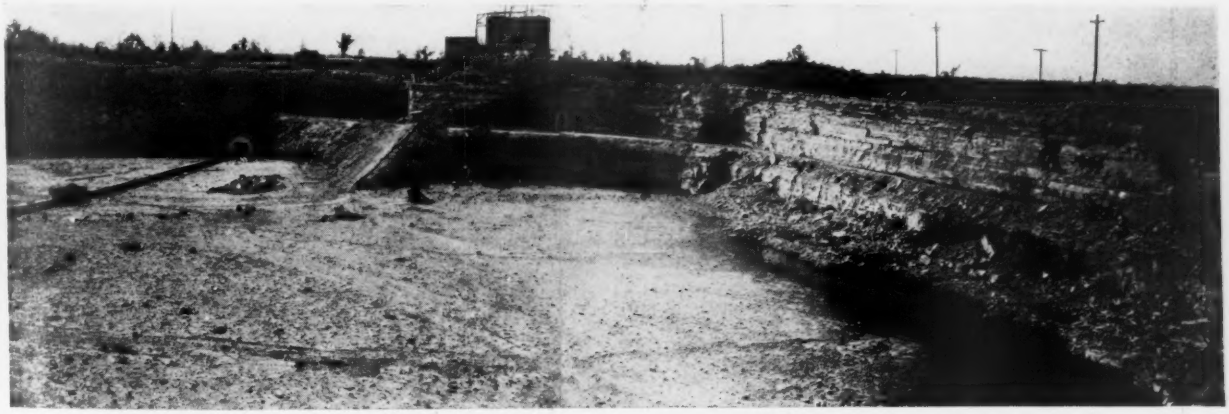
The incline, to the dumping point in the plant, is 300 ft. long, having an inclination of 22½ deg. It is provided at the bottom with a spring switch so that the empty cars are automatically returned to the "empty" track. Cars are pulled up one at a time by a double-friction, single-drum, Allis-Chalmers hoist powered by a 50-hp. slip-ring induction motor. When a car reaches the dumping point, a bar, bolted in a horizontal position to the lower end's door and extending 12 in. beyond the sides, comes in contact with two sharply inclined rails, thus raising the door and allowing the load to dump between the rails directly into the crusher.



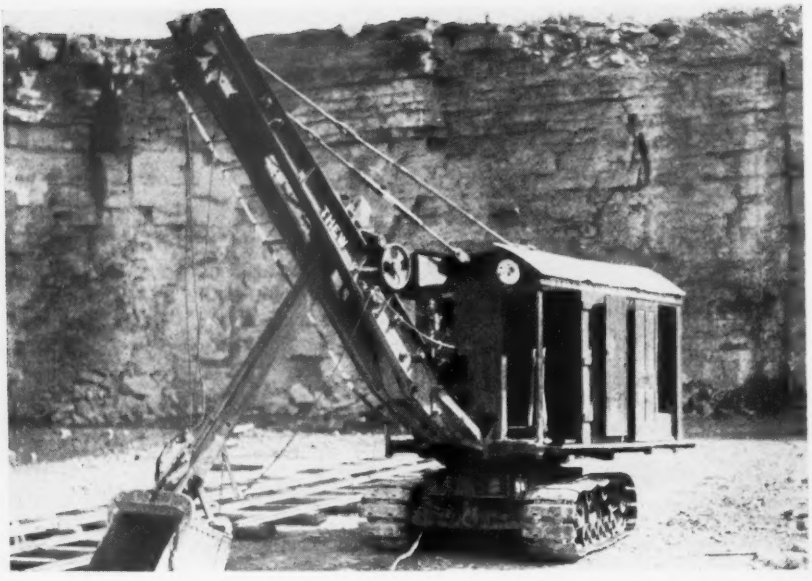
The substation. Electricity is received here at 4000 volts, where it is stepped down to 220 volts

Above the crusher, mounted on a track, is a 16-ton Yale & Towne chain hoist which serves not only for repairing the crusher but also for replacing derailed cars. A small hand winch with ⅜-in. cable is in readiness for removing oversize boulders that threaten to choke the crusher.

Electricity is received at the plant at 4000 volts and is stepped down to 220 volts which is used on every unit in the plant. A second transformer reduces the current to 115 volts for lighting purposes. A central control station on the ground floor of the building is comprised of a



The quarry is oval shaped, being more than 800 ft. long, 500 ft. wide—more than 400,000 sq. ft. of quarry floor—with a face of 52 ft.



This electrically powered, crawler-tread shovel loads the plant's entire 600-ton per day output

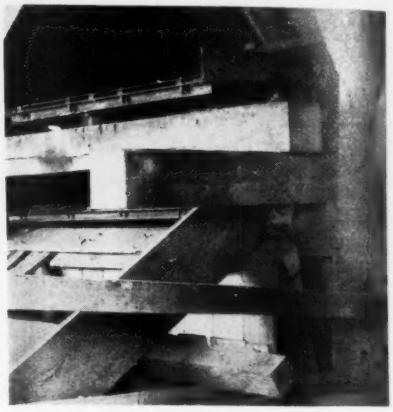
main switch which controls every motor in the plant as well as individual switches. In addition there is a switch at each machine so that it is unnecessary to go to the central control station to shut off the power for any one or all units. All motors, as well as crushers, screens, elevators and the hoist were furnished by the Allis-Chalmers Mfg. Co., Milwaukee, while the belting, both transmission and elevating, was furnished by the Main Belting Co., Philadelphia.

Wagons and trucks are loaded from the bottom bin gates, while cars are loaded from the side

Primary Crusher and Scalper

The primary breaker, a No. 12-N gyratory, is driven by a 125-hp. slip-ring induction motor running 865 r.p.m. with a 16-in., 8-ply rubber belt of 22-ft. centers. This machine is set to discharge at 4 in. and empties directly into a No. 12, style B, belt-bucket elevator of 47-ft. centers which delivers the stone to a 48-in. by 12-ft. scalping screen inclined at 1¾ in. per foot. This screen has three sections, the first two having 1¾-in. perforations and the third 4-in. holes. As there is no demand for 4-in. stone at this time, this size is chuted with the rejections of the screen to a No. 5-K gyratory, which is directly under and to one side of the scalper. The company plans to replace the 4-in. section of the scalper with a third 1¾-in. section which will greatly reduce the amount now being handled by the No. 5. The product of the two 1¾-in. sections is chuted direct to the No. 8 elevator. The first (No. 12) elevator and the scalping screen are driven by one 40-hp. slip-ring induction motor, speed, 865 r.p.m.

The No. 5 crusher is set to discharge at 1¾ in. and its product is elevated by a No. 8, style B, belt-bucket elevator of 80-ft. centers. This elevator empties directly into a 48-in. by 24-ft. sizing screen of six sections, the first three of which have 1¼-in. perforations and the other three 1¾-in. The rejections move by gravity to a No. 3-D gyratory driven by a 25-hp. motor and after being recrushed are elevated in the same elevator that serves the No. 5. This elevator and the



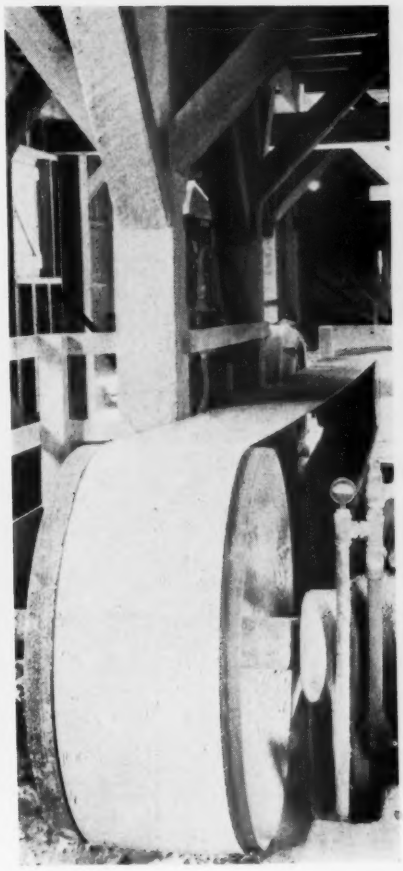
The 5x10-ft. shaker screen. Its surfaces are 3/4 and 5/16 in.

sizing screen are driven by one motor—a 50-hp. slip ring.

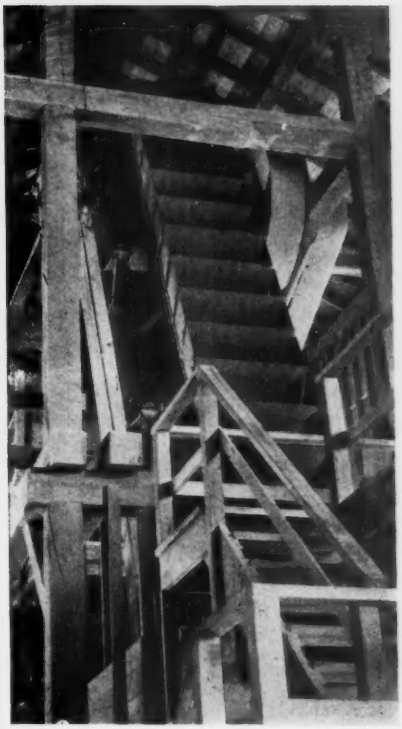
The first two sections of the sizing screen have an outer jacket of ¾-in. perforations and the fines passing through it are chuted to a double-surface 5x10-ft. compensated type shaking screen mounted at an incline of 1½ in. per foot. The upper surface has ¾-in. openings and the bottom

Side view of plant. Only part of the incline, at extreme left, is visible

The scalping screen is 48 in. in diameter by 12 ft. long. It and the main elevator are driven by a 40-hp. motor



The No. 12 crusher drive. The belt is 16-in., 8-ply, driven by a 125-hp. slip-ring motor



The No. 12 conveyor which handles the stone between the primary breaker and scalping screen

one has 5/16-in. openings. Rejections from this machine are put in the 1¼-in. bins while the material passing through it is binned separately and sold as, "One-half inch without dust." The shaker is powered by a 10-hp. squirrel-cage induction motor.

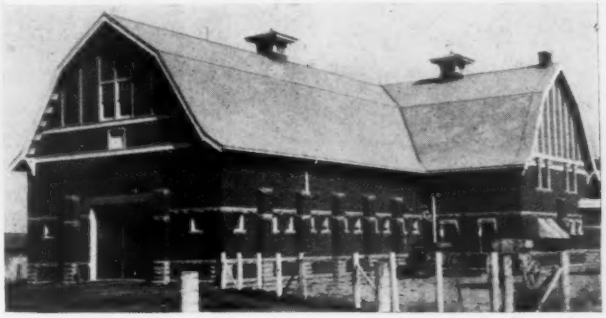
Thus, the company produces four distinct sizes: 1¾ to 1¼ in.; 1¼ to ½ in.; ½ in. without dust and "crusher sand." The latter product is in considerable demand as it is used extensively throughout that section of the state to take the place of "torpedo" sand for making concrete. Since the material serves as well as the more commonly used natural sand, as has been proven in various tests, the Lutz company is justified in doing away with the ordinary term "screenings" and giving the product a more dignified and distinctive name.

There are six bins, each of 100 tons capacity, equipped with both bottom and side discharge gates. Trucks are loaded from the bottom-discharge gates which are 15x15 in. while railway cars are loaded from the side of bins through 12x14-in. quadrant gates fitted with 4-ft. steel chutes which are raised and lowered by means of the usual rope, pulley and counterweight.

Although the plant's rated capacity is 1000 tons per day, it is only being operated at from 550 to 650 tons. Its design is such that its maximum rated capacity can be increased to 2000 tons by installing additional machinery, for which space has been reserved.

At present the company is enjoying a strictly local business, but it has recently received orders which will have to be shipped by railroad. This is almost with regret, however, for the local business is much more profitable, inasmuch as the company is relieved of all loading expense, the contractors doing their own loading.

One contractor has put in a section of track right at the plant and has installed a batch-mix bin served by a Browning locomotive crane. He ships in his cement, and since he uses "crusher sand," he has all of his aggregates "on the job," needing

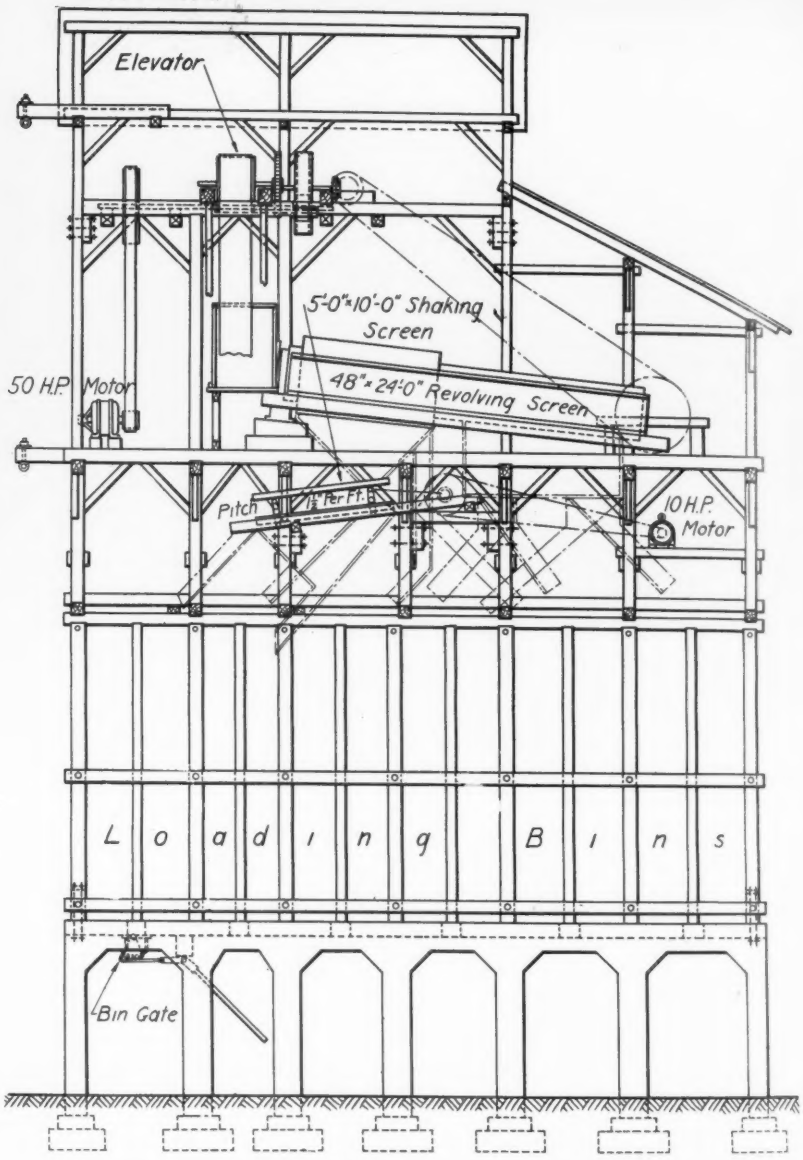


The combination blacksmith and machine shop; right, recently completed garage which also is a barn. The right end of this building is the office

Robert Lutz, president, father of Richard W. (It required lots of coaxing to get him to pose)

no more than a single handling. He mixes the three in the batch bin and his trucks

This is Richard W. Lutz, secretary and general manager. (He positively refused to be photographed, so we had to snap when he wasn't looking)



End elevation of plant which gives an excellent idea of the relation of the screens

get a load and deliver mixer batches direct to the concrete mixer.

Plans for Storage

Mr. Lutz is planning to extend a swinging telescoping steel chute from the sizing-screen floor of the plant which will reach a ground area that will accommodate approximately 10,000 tons of road stone in storage. Chutes under each section of the sizing screen will lead to this chute so that all sizes required by highway specifications will be included. This will afford a storage method of the most economical character as the company will have to handle the stone only once—in the quarry.

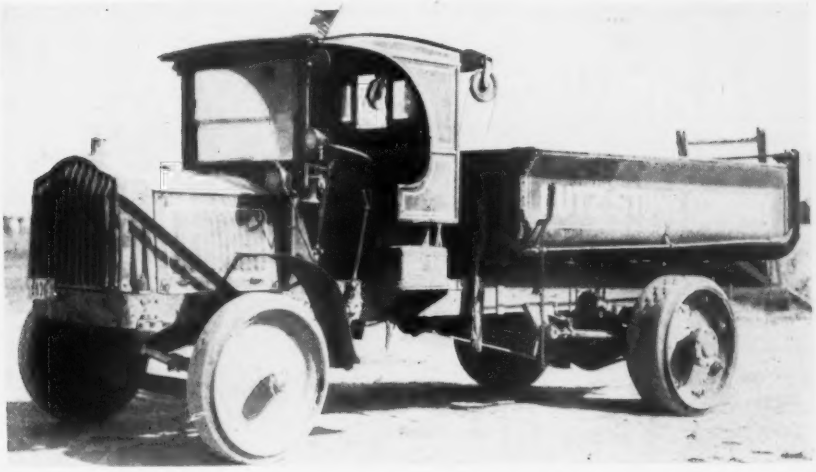
Entire Operation "Well Groomed"

One very interesting feature of the Lutz company's operation is its cleanliness. The illustrations of both the quarry and plant are proof of that statement. The quarry floor—covering more than nine acres—is practically free from boulders, scrap lumber and other rubbish usually found in a quarry, while the plant, which is painted a rich shade of cream, makes an unusually splendid picture as it stands against the otherwise unbroken horizon.

Combination Garage and Office

The company owns three large Packard trucks, two of 6-ton and one of 4-ton capacity for making deliveries about the city to contractors who have no trucks available. A new building, constructed of stone and brick with a slate roof, serves as a combination, garage, barn and office, the latter portion of the building being divided into two spacious rooms with all

This machine is owned by a contractor who mixes his aggregate right at the plant



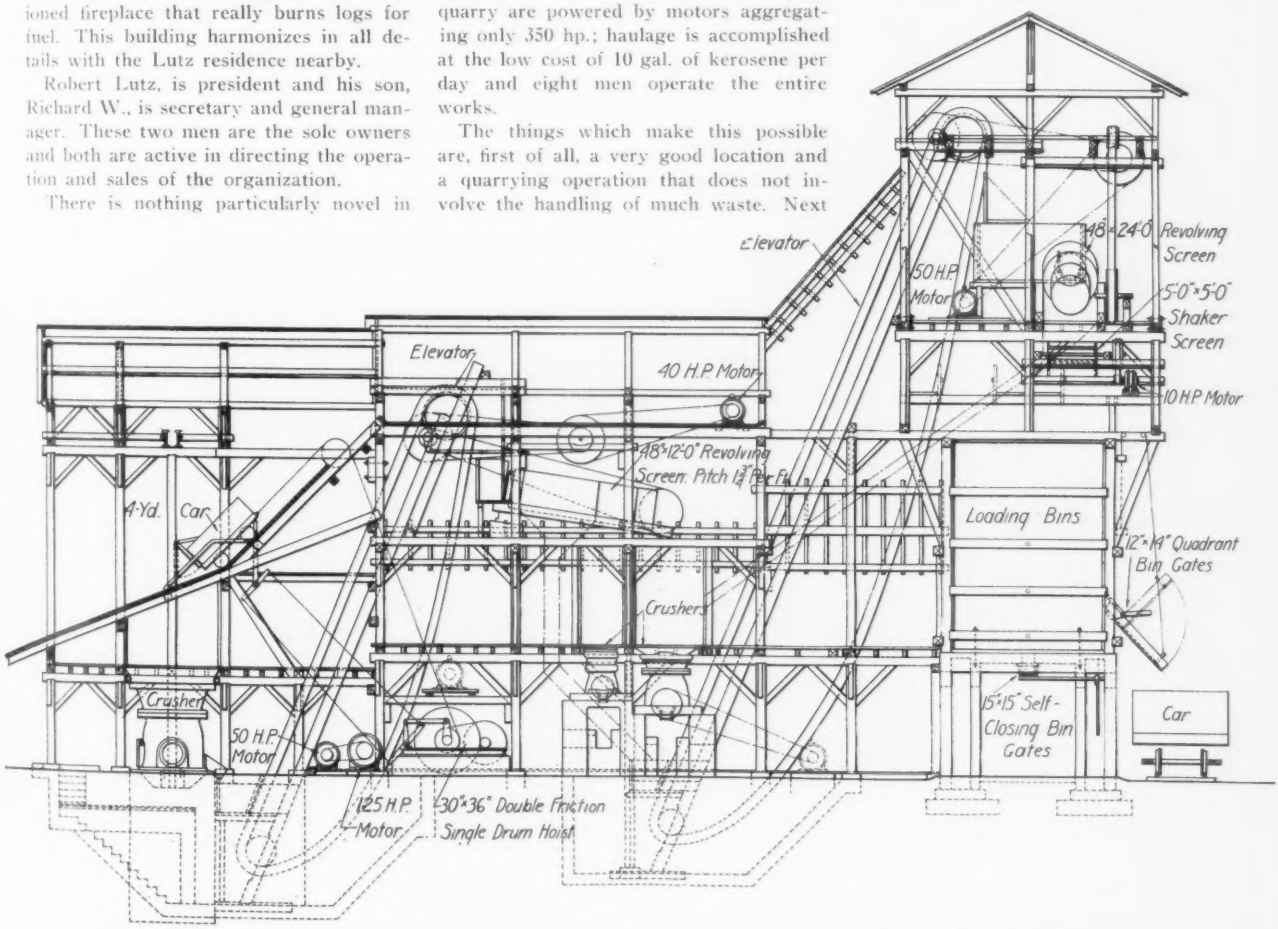
The company owns three trucks like this one and delivers right to the local contractors' job

modern comforts including an old-fashioned fireplace that really burns logs for fuel. This building harmonizes in all details with the Lutz residence nearby.

Robert Lutz, is president and his son, Richard W., is secretary and general manager. These two men are the sole owners and both are active in directing the operation and sales of the organization.

There is nothing particularly novel in this plant's design for it is not very different from many others about the country. The truly interesting feature is the operation as a whole since it produces a *medium* tonnage of stone at a low cost per ton. It is an easy matter to analyze the truth of this statement. The plant and quarry are powered by motors aggregating only 350 hp.; haulage is accomplished at the low cost of 10 gal. of kerosene per day and eight men operate the entire works.

The things which make this possible are, first of all, a very good location and a quarrying operation that does not involve the handling of much waste. Next there is the employment of machinery of such a size (and strength) that it can do its work easily and stand up under emergency conditions. And finally there is *organization*, by which the work is coordinated so that the operation moves as a whole, without undue friction.



Side elevation of plant from which the flow sheet may be traced. Note the primary crusher at left. Absence of choke-ups at this point insures steady running

A Successful Portable Sand and Gravel Plant

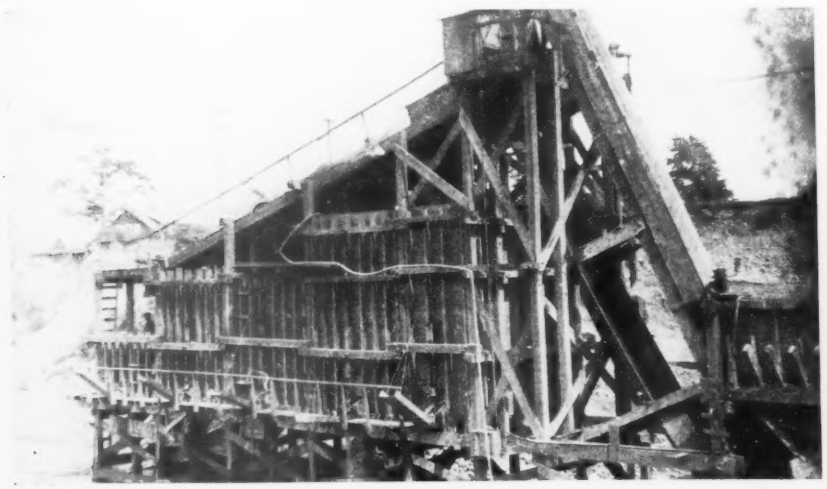
Battjees Sand and Building Material Company Successfully Solves the Problem of Working a Long and Narrow Deposit by Bringing the Plant to the Material

A PROBLEM which at some time has confronted almost every sand and gravel operator is the method of working a long and narrow deposit, where the tonnage of material was too small to permit a large investment in plant and equipment. Many an operator has given it up before beginning while others have experimented with portable and semiportable plants, and found them to be losing propositions.

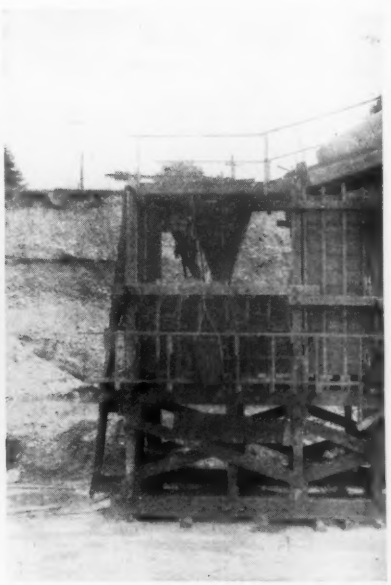
The Battjees Sand and Building Material Company, of Grand Rapids, Mich., have tackled the problem and have succeeded in designing a portable plant, of sufficient capacity to be a paying proposition, which is a success, as is proven by two years of satisfactory operation.

The deposit upon which this plant is working is 3000 ft. long and 200 ft. wide. The depth is about 25 ft. and the material is of such a nature that it can be successfully excavated with a grab bucket. The plant is in two units, a No. 18 Osgood steam shovel and a portable screening and storage plant on rollers. Remarkably simple in design and operation, it has a capacity of 300 yd. in a 10 hr. day, employing the services of five men. It is easily moved forward on rollers by the shovel, moving about 85 ft. at a time with no other adjustment than loosening the shaft to prevent this being broken by the twisting of the frame.

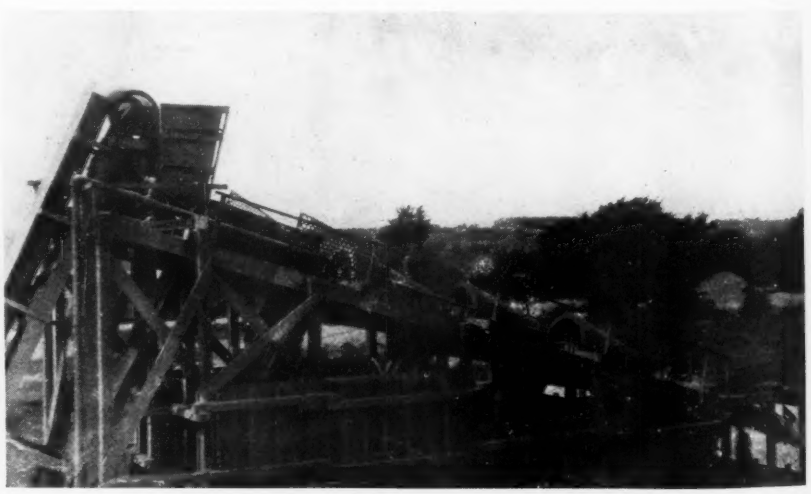
The shovel equipped with a 1-yd. grab bucket delivers the material to grizzly built on an incline, of triangular shaped iron bars that rejects all material larger than 2 in. This rejected stone falls down the incline to a waste pile and is used to fill hollow places in the floor of the pit, caused by the excavation of the sand.



"Ship" construction makes it possible for this 300-yd. washing plant to be moved 85 ft. at a time without damage, enabling the operators to work a long and narrow deposit profitably



The sand end of the plant has a standard sand settling device and bins



The screen line is the same as in a standard plant

The start of operations, showing the crane bucket ready to dump into the hopper. Behind the hopper is the elevator that carries the bank material to the screens and sand settler

The suitable material (minus 2 in.) falls through the grizzly into a hopper and bucket elevator, which lifts the material 55 ft. to the top of the plant, where it is discharged to a series of three conical screens

A standard steam shovel rigged with crane boom and clamshell bucket is used to excavate the bank material. Note the depth of the face

operating on one shaft, the usual arrangement found in plants with Link Belt equipment. These make three separations and deliver the various sizes to their respective bins.

The first screen separates the 2-in. material and delivers it to a 50-yd. storage bin; the second screen delivers the 1- to 2-in. material to a 40-yd. bin; the third, the ½- to 1-in. material to a 30-yd. bin. The reject from this screen passes through the Dull sand cone into a 20-yd bin. There is no scrubber. The material simply joins a 7-in. stream of water at the top of elevator.

The water is pumped by a 4-in. Manistique centrifugal pump, direct-connected to a 10-hp. Ideal electric motor. Another Ideal motor of 15 hp. drives the elevator and screens.

The plant is built of yellow pine with 3-in. oak plank under the sills to present a hard surface to the oak rollers. This construction is used throughout as a safeguard from pulling apart, etc. Material is unloaded from the bins into trucks which deliver to near-by road work or city jobs. It is intended to install a locomotive crane and handle the material into storage piles this fall so as to obviate winter operation of the plant.

This is the second year the plant has been in operation. No important flaws in design or construction have developed. Experience with this plant has indicated to the operators that the design of the plant should be kept as low as possible.

The plant was designed by H. L. Battjees, general manager, after looking over several semi-portable plants. Elmer Satterlee is superintendent.

Diesel Engine Shovel in Australia

AT Lilydale, which is some 23 miles from Melbourne, the David Mitchell Estate has in operation the first Diesel engine shovel to be used in Australia.

The shovel was installed in January of this year in a limestone quarry operated by this estate.

This deposit, which has a depth of 150 to 200 ft. is covered with an overburden consisting of a hard sedimentary gravel, interspersed with a considerable amount of ironstone. The shovel was first put to work removing the crown of the hill in which this deposit lies, and has been working against a face of overburden 30 to 40 ft. deep. The material when blasted with dynamite breaks up easily and presents a good average digging condition to the shovel.

The shovel loads into four-yard dump cars which at the present time are hauled by horses. This has led to so much idle time on the part of the shovel that the owners are planning to install small electric locomotives in order to permit the shovel to operate to a higher capacity.

The length of haul to the spoil area, which is located on the opposite side of the hill, is about 400 yd. down a grade of 1 in 50. The shovel which is equipped with a dipper of a rated capacity of one yard fills a car to heaped measure in four swings, an estimated load of 5 cu. yd. The average output per eight-hour day with but two or three cars in service has averaged about 400 cars or 2000 cu. yd. per week of five days. In spite of this the owners report that the cost of operation, including due allowances for interest, depreciation, etc., has amounted to one-eighth of the hand labor methods previously employed.

The shovel is also used for excavating the limestone which is previously shot down with dynamite. The rope thrust has proven highly efficient in this heavy digging.

The shovel is a 30-B Bucyrus mounted on caterpillar traction and carries, as stated, a 1-cu. yd. dipper. The power unit is a single heavy-duty Diesel-type engine, specially designed for this shovel. The thrust of the dipper is accomplished by a patented rope drive, there being no engines or machinery on the boom as is usual on the ordinary type of shovel. The machine has given splendid service and is extremely simple to handle, the operator preferring to operate it to a steam shovel. The engine, it has been noted, responds very quickly to the load, even more so in fact than a steam-shovel.

The fuel burned is an oil of .892 sp. g., running 250 gal. to the ton. This is supplied by The Anglo-Persian Oil Company and delivered on the site for the sum of about £4.75 ($23.08). Up to the present it has been impossible to obtain accurate figures of fuel consumption, but it is estimated that the engine has been burning about 40 gal. of oil per week, at 9.2 cents per gal., which would amount to about $3.70 per week for fuel.

The limestone, which is of an exceptional quality, shows a content of 97 per cent. The greater part of this is burnt to lime in six lime kilns. This lime is of a very high quality and commands a ready sale on the building market.

The remainder of the plant consists of the necessary hoists, air compressors and rock drills.

Incidentally, the fact may interest our readers that this property forms part of an estate which was originally held by the father of Madame Melba.—*The Excavating Engineer.*

Nature, Preparation and Use of Pulverized Coal*

VIII—A Description of the Bonnot Mill and the Tube Mill—Cost of Pulverized Coal Plant—Fire Hazard and Precautions

By Richard K. Meade
Chemical and Industrial Engineer, Baltimore, Md.

THE Bonnot mill as used for coal consists of a pulverizing unit, a separator, an exhauster fan and a collector (Fig. 17). The grinding parts in this mill consist of a concave ring and four rolls. In the case of this mill, however, the ring is held vertically in the main frame, and the rolls revolve around inside of the ring, being held in position and driven by means of a driver. This latter is cast in one piece of hard steel and the rolls are not attached to this by bearings but merely rest in recesses or pockets in the driver. This driver is also so shaped as to throw the material between the rolls and ring as it revolves.

The air currents induced through the mill by the fan convey the material up into the separator. This latter consists of a chamber made of galvanized steel plate, which rests on top of the mill. In this, the coarse material settles out of the air and drops back to the grinding unit while the fine material is carried out of the separator by the air and blown into the collector. The air after being freed from the coal particles is returned to the mill. The air separating and collecting part of the system is somewhat similar to that employed in the Raymond mill.

As is the case with the Raymond mill, it is possible to set this collector sufficiently high to dispense with the use of an elevator. These mills are used principally in plants where the Holbeck system of distributing coal is employed, as the patents on the latter system are controlled by the Bonnot Co.

The manufacturers give the following as the output and horsepower requirements of the Bonnot mill, including exhaust fan, when grinding bituminous coal of average hardness to a fineness of 95 per cent passing the 100-mesh sieve.

TABLE XII. AVERAGE CAPACITY AND POWER REQUIREMENTS OF BONNOT MILLS GRINDING BITUMINOUS COAL

Size—inches	Size feed—inches	Output in tons per hr.	Hp. to operate
18	1	1¼	35
27	1¼	2½	60
36	1½	5	95

Tube Mill

Most of those who read this article are familiar with the tube mill. As its name implies, this consists of a rotating tube or cylinder, the dimensions of which are from 5 to 7 ft. in diameter and from 18 to 22 ft. long. This cylinder is supported at each end by means of short trunnions and is revolved at from 22 to 27 r.p.m. by means of a girt gear and pinion at one end of the mill. The cylinder is lined with some hard substance such as chilled iron, quartz blocks ("silex") or trap rock and filled with flint pebbles, steel balls or slugs.

The coal to be powdered is fed through a hollow trunnion and is reduced to a powder by means of the grinding action of the pebbles or slugs as they roll over one another when the mill revolves. The finely ground product issues from the other end of the mill either through a hollow trunnion or else through slots in the perimeter. The fineness of the product is regulated by the quantity of material fed into the mill.

The tube mill requires that the coal fed to it shall be ground so that all of it will pass a 10- to 16-mesh screen. This latter operation is usually conducted in a ball mill, a kominuter, or more frequently in some form of hammer or cage mill, such as the Pennsylvania, Williams or Jeffrey hammer mills, or the Steadman cage disintegrator. The good points of the tube mill are its simplicity and the fact that repairs are exceptionally low. Its bad features are high-power consumption per ton of output, large floor area required by the installation and the disadvantages of the two-stage process necessitating as it does an extra mill, bin and elevator.

The output and horsepower required to drive tube mills when grinding bituminous coal of average hardness to a fineness of

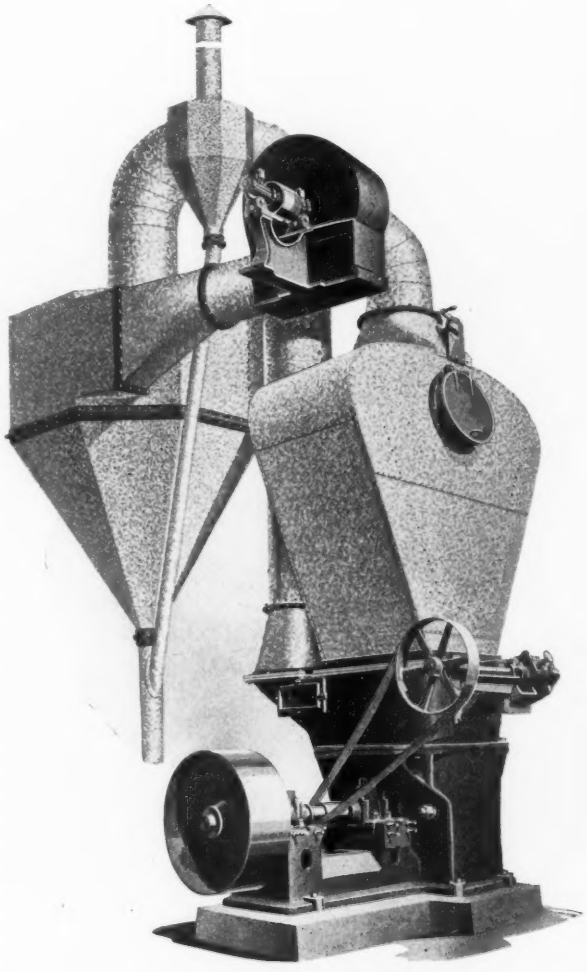


Fig. 17—Bonnot coal pulverizer

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TABLE XIII. TUBE MILL DATA FOR GRINDING COAL

Size Diameter	Size Length	Mill charged with pebbles: Weight of charge of pebbles, lb.	Mill charged with pebbles: *Output in tons per hour	Mill charged with pebbles: Hp.†	Mill charged with steel balls and pebbles: Weight of steel balls	Mill charged with steel balls and pebbles: Weight of pebbles	Mill charged with steel balls and pebbles: *Output in tons per hour	Mill charged with steel balls and pebbles: Hp.†
5′	22′	20,000	5	80	9,000	15,000	8	100
5′6″	22′	24,000	6½	100	11,000	18,000	10	120
6′	22′	29,000	8	125	13,000	22,000	13	150

*Mill to receive a feed all of which will pass a 16-mesh screen.
†About 150 per cent of this power is required for starting. This does not include power required to prepare feed for the tube mill, which will add about 35 per cent to above figures.

95 per cent passing the 100-mesh sieve is given in Table XIII.

Cost of Pulverized Coal Plant

The general arrangement of a plant to produce pulverized coal is shown by Figs. 18 and 19.

The cost of a plant varies considerably with the equipment chosen, etc., but the following estimate will give a general idea of what a plant to produce 5 to 6 tons of pulverized coal per hour will cost at the present time. This cost will not vary materially from this estimate if Raymond, Fuller or Bonnot mills are selected.

BUILDING AND BINS

Foundations, 90 yd. concrete at $15 in place	$1,350
Structural steel, 40 tons at $90 in place	3,600
Roofing, 4200 sq. ft. galvanized iron at 12 cents in place	504
Siding, 4300 sq. ft. stucco at 35 cents in place	1,505
Miscellaneous	1,500

EQUIPMENT

One single-roll coal crusher 24x24-in. in place	1,900
One magnetic separator and track feeder	800
One indirect heat drier 3x30-ft. in place	5,000
One Pulverizer mill complete in place	8,000
One automatic coal scale in place	950
Two elevators and casings in place	2,300
Motors in place and wiring	5,225
Speed reducers, clutches, couplings, etc.	1,500
Coal distribution system	3,500
Miscellaneous	3,000
Engineering and construction expenses	6,100
Total	$46,734

Fire Hazard and Precautions

In the early days of the cement industry several bad fires and explosions occurred in connection with the pulverizing of coal. As a result, the danger of an explosion was at one time often raised as an objection to the use of powdered coal. This latter danger, however, was always very largely exaggerated and it is now very seldom that an explosion occurs in a coal pulverizing plant.

Powdered coal *suspended in air* is a very explosive substance—indeed, the energy of a pound of coal in this condition is greater than that of a pound of gunpowder. At the same time, however, powdered coal *in a mass*—that is, when it is in a pile or a bin—burns very slowly and with absolutely no explosive effects. The idea therefore for preventing coal mill explosions is to prevent dust and not to allow the coaldust to be stirred up and mixed with air.

The department of the plant in which the coal is ground should always be well ventilated so that no gas can accumulate. This can be accomplished by the use of a monitor running the full length of the roof and having louvers so that any gases which may be generated from the coal will rise to the roof and so escape. In place of the monitor, any of the accepted forms of roof ventilator can be used. Reinforced concrete offers a splendid material for the construction of the fuel mill building as the walls are straight and there are no projections to catch dust.

In order that any fires which start in the coal pulverizing department may not be communicated to other parts of the mill, this building should be fireproof and located with at least an alley between it and the other parts of the mill. Stairways, bins, platforms, conveyor troughs, elevator casings, etc., should be made of sheet steel. Platforms and steps should be constructed of perforated sheet steel, or, better still, Irving's subway grating, or some similar form of bar grating, may be used to advantage as less dust collects on them in consequence.

The electrical wiring of the mill should be carefully installed and the lights placed to best advantage. Arcing and sparking

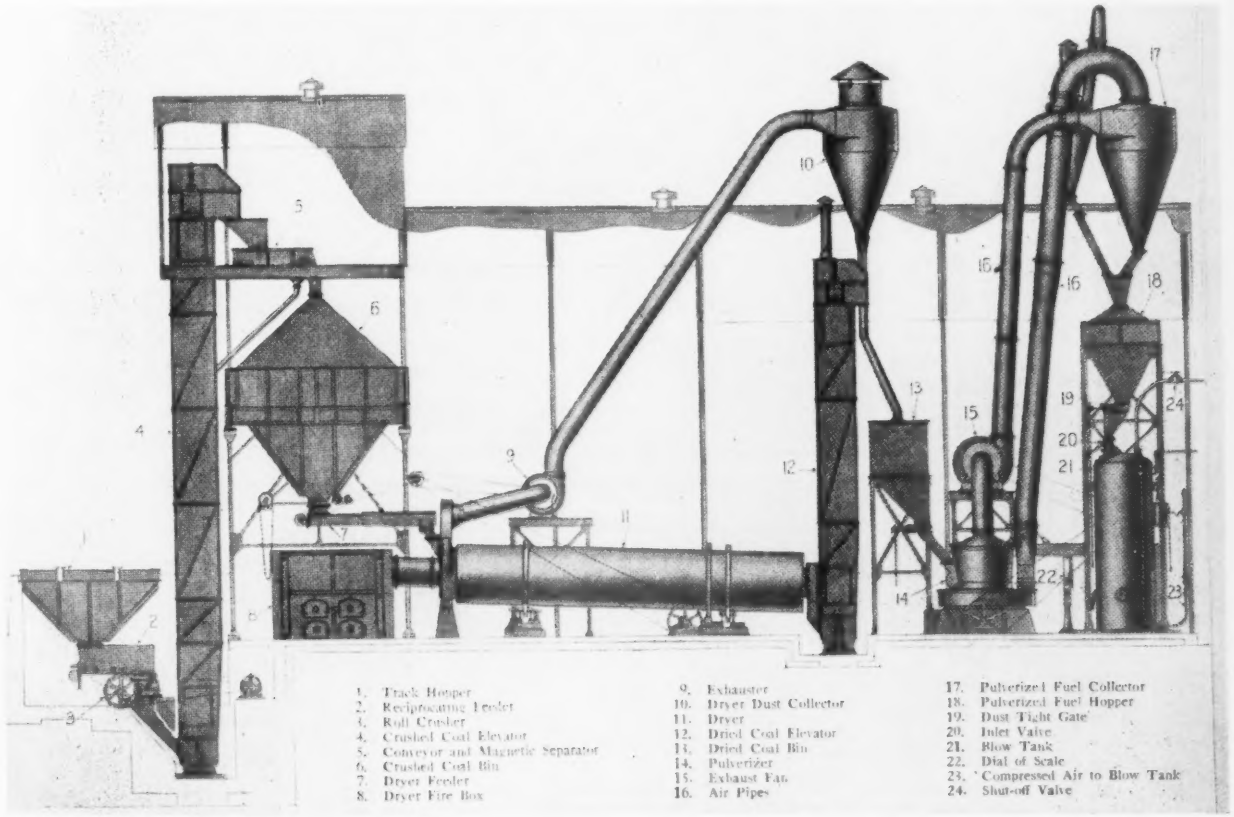


Fig. 18—Typical arrangement of pulverized coal plant—the Quigley system

may cause explosions. The lights should be of the incandescent type. Arc-lights are not permissible. Many fires in coal mills result from attempts being made to repair elevators and mills by the light of the ordinary workman's torch. The hammering shakes the dust from its lodging-place and the naked flame ignites the mixture of dust and air. No naked lights should be allowed at any time in the coal-pulverizing building and warnings against the uses of torches, etc., should be displayed prominently here and large signs to the same effect should be placed upon the doors. This rule should be rigidly enforced with the penalty of dismissal for breaking it.

(To be continued)

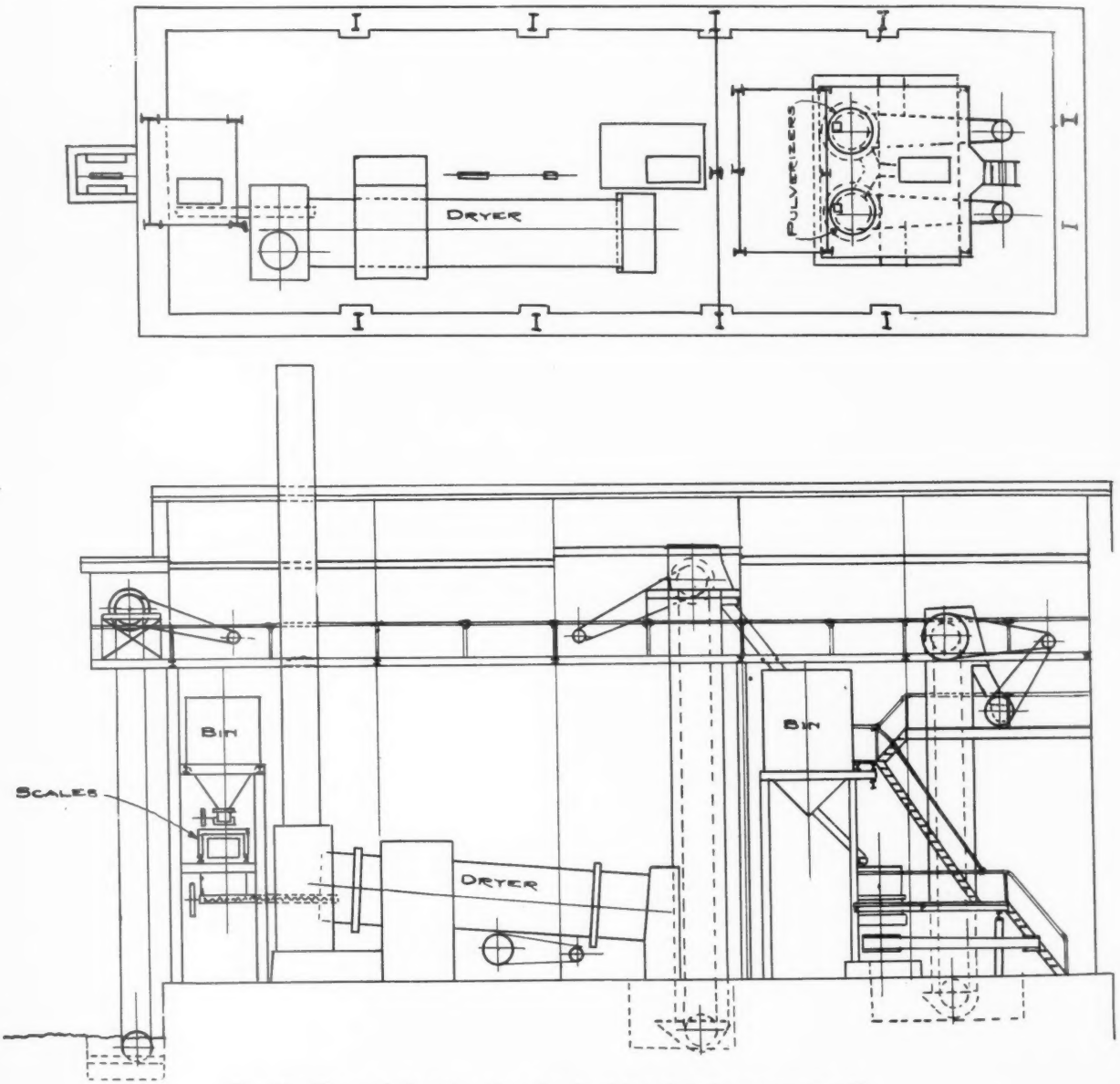


Fig. 19—Plan and elevation of coal pulverizing plant for a cement mill

Bureau of Standards Shows Way to Make Better Lime

EXPERIMENTS conducted at the Bureau of Standards have shown a way to improve the manufacture of hydrated lime so that the grade known as "finishing" hydrate is regularly produced instead of the grade known as "mason'" hydrate which, because of its lesser plasticity, commands a lower price. These tests have shown that plasticity depends not alone upon the colloidal content of the hydrate, but upon the effect on this colloid of the manufacturing process.

This colloid, just like glue, must not be allowed to dry out during the manufacturing process, and it must also be prevented from flocculating itself when the mixing water is added preparatory to use, says a Department of Commerce bulletin.

It has been found that the drying out can be prevented by letting the freshly made hydrate cool in an atmosphere of steam, while flocculating can be prevented by adding small amounts of a readily soluble calcium salt. A hydrator designed to apply these principles has just been competed for further experiment.

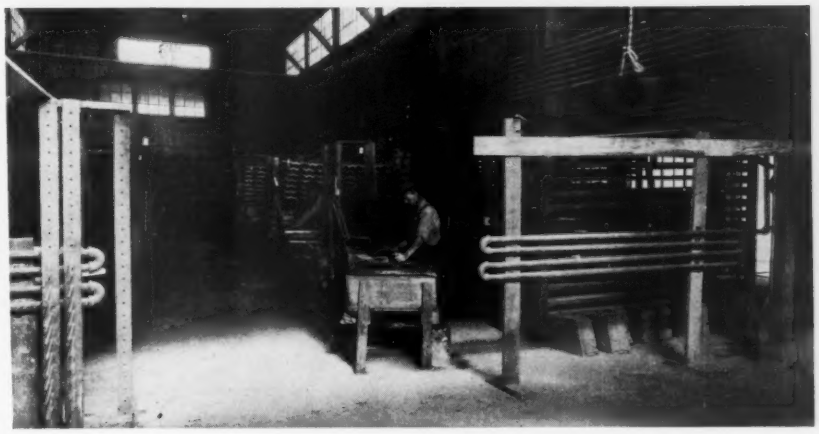
Making Concrete Roofing Tile

A Form of Concrete Product Which Offers a Market for the Fine Aggregate Produced in Excess of Demand in Many Parts of Country

By A. J. R. Curtis

IT is safe to say that one of the greatest undeveloped fields for concrete building units of any sort lies in the direction of concrete roof coverings. In only a relatively few cities and towns are concrete roofing tile being made and marketed, although wherever once introduced they have soon attained tremendous favor. One concern in Cleveland, for example, put on over 4000 roofs in two or three seasons and another at Rochester put on 1800 roofs in a similar period.

Of course every new material must prove its worth in local communities where it makes a bid for business, and concrete tile is no exception; but this material has already passed through the experimental stage as well as the period of probation which discriminating buyers always require before they are ready to accept something new. "Is it strong and durable?" "Is it water and weather-resistant?" "Are the colors permanent?" and similar questions may now be answered decisively, for the technical principles involved in the manufacture of good tile are now well known and understood.



The tiles are molded and then cured in a warm, damp atmosphere. Curing is an important part of the process

Roofing Requirements

A good roofing is necessarily something more than merely a roof covering. In the first place, the tremendous fire risk involved in the use of wooden or other coverings that will burn, suggests that a good roof covering should be fire-resistant and unburnable. In order to economize on roof framing on new structures as well as become adaptable for use in recovering old roofs, a good roof covering should be fairly light in weight—at least no heavier than can be helped. The preferred roofing must be practically permanent in color—even under the most exacting conditions. Every detail as to shape of unit and method of combining must be perfect, and the procedure in laying well understood.

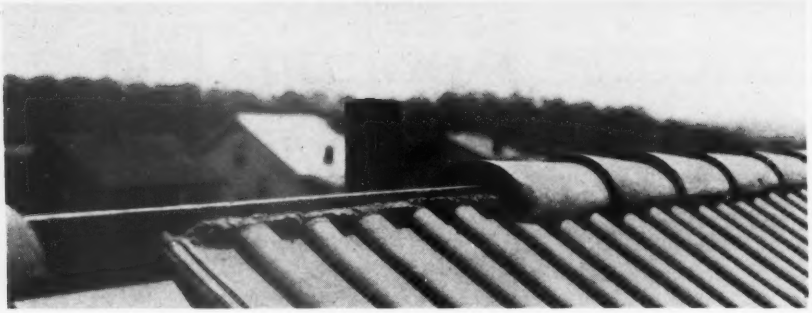
The roof of any small or moderate sized structure is one of the most important features from an architectural point of view. Small residences are bound to be rather plain—often severely plain—so far as the exterior walls are concerned, and the roof is therefore of great importance as a detail on which the architect may display his talent. An attractive roof greatly improves the appearance of the building, usually at small expense to the owner. In a suburb of Chicago, a concrete tile roof which cost $150 or more than another type made the house salable at $500 more than was obtained for identical houses without the concrete tile roof.

Part of a roofing tile stock, showing method of stacking. The tile must be thoroughly aged before laying and ample storage space is required

Development of Concrete Tile

Concrete roofing tile has been in general use in Germany and the Scandinavian countries for many years. Large concrete tile, suitable for the roofs of industrial buildings, have been used successfully throughout America for a number of years, and limited quantities of smaller tile, suitable for residence and general use have been made in limited quantities during the same period.

The market for roofing is estimated from reliable statistics to be about 200 squares per thousand of population annually—this includes both new buildings and the re-roofing of old ones. The greatest field for the small or residence type of roofing tile is in the re-roofing of old houses. The number of houses to be re-roofed each year often is determined approximately by dividing the number of houses within a plant shipping radius by 20, the average life of roofs other than tile. A survey of any community will show



Construction at the ridge is explained by this picture

a great potential market of which a plant need obtain only a small percentage in order to operate at full capacity.

The technical development of concrete tile has been in three directions primarily:

(1) The problem of imparting to the tile permanently weather-resistant colors has received more attention than any other in connection with this product. The reds, greens, and grays are in greatest demand. Only the purest iron oxide pigments can be successfully used for the red colorings and only the best cromium oxides for the greens. Gray tile are usually the natural color of the concrete mixture, which is usually very attractive and absolutely permanent in shade. The gray color contrasts pleasingly with brick, stone and frame walls as with those of concrete and stucco. Darker gray shades are obtained by the introduction of a little lamp black.

(2) A great deal of study has been given to design of tile and methods of laying which would reduce the weight of the roof. While shingle and slate roofs lap three thicknesses and clay tile roofs lap two thicknesses, concrete tile are being introduced which lap on ends only.

(3) Most of the fine quality concrete tile has been made on hand operated machinery of limited capacity. During the last few months remarkable progress has been made in the introduction of heavy automatic machines of greatly increased output.

Plant Required to Produce Roofing Tile

The manufacture of concrete roofing tile on an efficient scale requires a substantial but not overly expensive plant. The mistake too often made by new manufacturers is to make the start with funds which seem sufficient to provide a suitable plant unit, entirely overlooking the large sums generally required to cover ample stocks, credit which must be extended in ordinary building operations and the large quantities of raw materials and supplies which must be carried at some seasons.

Roofing tile machines are quite simple and standard in design. Two general types are available—hand tamp and automatic power tamp. The hand tamp machine will produce about 375 tile per day or 2½ squares. A plant usually consists of a group of three to five machines for regular tile and one machine for specials. The automatic types have a continuous chain horizontal conveyor onto which pallets are fed. The conveyor carries the pallet under a hopper containing the aggregate, the pallet is filled and then passes under a pressure device either in the shape of a series of rolls or a small continuous light tamping arrangement. The pallet then travels under a color hopper where color is applied to the surface of the tile. The unit is then carried from the conveyor and stacked in racks for curing. The automatic machines have a capacity of between 20 and 30 squares per day.

Curing Equipment

In addition to the tile machines, mixing and conveying equipment adequate provision must be made for curing the product. The small volume and thin section of this product makes proper curing very important. The most economical curing method now used consists of storing the tile in chambers where the air is kept saturated by means of fog nozzles and a temperature ranging from 90 deg. to 130 deg. Fahr. is maintained for 18 to 24 hr., by means of steam coils. In order to protect the tile against discoloration in curing, the product is usually left in a moist chamber at ordinary temperature for 3 hr. or more before the temperature is raised to the range indicated above.

Considerable storage space is required, where the product can be stored for at least 18 days after coming from the curing chamber. During that time the tile are kept constantly moist and preferably are protected from the direct rays of the sun.

Under average conditions, a plant producing about 11 squares of roof per day on four hand machines, should represent an expenditure of about $3000 for machines, $2000 for pallets, $3000 for other mechanical items such as cars, racks, motor shafting and conveyors and enough additional in the way of miscellaneous expenses to bring the machinery costs to $8500 or $9000. The curing equipment may be carried at $1500 and perhaps $5000 to $10,000 included for the building with the curing chambers and material bins. The cost of the building is an important variable depending on whether it is built new and bought and reconditioned. If the total outlay on such a plant is reckoned at about $15,000, the total invested capital should be from $20,000 to $25,000.

Automatic Machines

Should the demand warrant an output of ten roofs or more per week, an automatic roofing tile machine should be carefully considered. For a plant capable of producing about 28 squares per 8-hr. day, the items of factory investment might be put down as follows: Automatic machine, $5000; 5000 pallets, $5000; cars and racks, $2500; mixer, $500; other equipment including conveyors, motors, shafting screens and color mixer, $1700; freight, installation and miscellaneous, $2300. To that should be added amounts as indicated above for curing equipment and buildings.

The total cost of a plant to economically manufacture 28 squares of good quality tile per day may run around $25,000, and with $10,000 added for working capital, it is evident that such a business should have $35,000 in funds at time of starting.

The model concrete masonry house which formed the centerpiece at the Boston Building Show was roofed with concrete tile

Then in the 11-square capacity plant the investment is around $2000 per square of daily capacity while in the 28-square capacity plant the investment would run under $1200 per square of daily capacity.

The writer will gladly estimate the cost of manufacturing tile at any given rate, with known conditions to work with, although the variation of circumstances make it impossible to make such estimates or to explain the items of cost in an article of ordinary length.

Since labor constitutes by far the largest single element of manufacturing costs, it is obvious that the plant must be laid out with the idea of conserving labor constantly in mind. Equipment must be so located as to eliminate every possible unnecessary movement by the work which may be economically accomplished by machinery in a plant of this size.

Characteristics of the Tile

The most commonly used types of concrete roofing tile are 9x15 in. in size and weigh about 5½ lb. each. One hundred and fifty tile are required to the square as ordinarily used.

A later design, by one manufacturer, contains a feature which makes it possible to lay tile of the same general dimensions 120 to the square. There is also a machine on the market making a tile 12x15 in., requiring 108 tile to the square. The average dwelling requires 15 to 25 squares.

The following information regarding the weight of several commonly used roofings will be of interest:

	Weight per square pounds
Concrete roofing tile, French, Spanish and other types	700- 750
Clay tile, various types	900-1800
Slate, various weights and grades	680-2000
Cement asbestos shingles	300- 600
Asphaltic	260
Wood shingles (ordinary light)	260

So far as replacement business is concerned, it is generally conceded that any roofing weighing more than 700 or 750 lb. to the square is at a disadvantage.

Tiles are being made in several attractive flat designs or shapes and in the Spanish or semi-circular shape. All of the special pieces required for a wide variety of work are made on the machine or accompany mold equipment, so that a minimum of cutting is required when the tile are laid.

Distinct Advantages of the Concrete Product

Being made without the necessity for burning, concrete roofing tile are absolutely regular in shape and true to the dimensions of the mold. They lay perfectly on the roof, making even contact and closing up the roof much more tightly than is the case with other tile. The smooth, regular appearance is a matter of favorable comment among those accustomed to looking at competing types. The valleys are more regular and the fitting around chimneys more nearly exact than in roofs of clay tile. Regularity in size and shape makes laying noticeably faster, since it is never necessary to sort or match tiles or compensate for irregularities. The greater weight of individual concrete units makes them less liable to move ment and more secure against damage by wind; the ingenious method of laying brings the weight per square of roof well under the weight of clay tile and the heavier grades of slate.

Residence roof prepared to receive concrete tile. The light longitudinal clinger strips are raised off the roof by thin furring

The concrete tile roof really is not in competition with asphaltic and other types of so called "paper" roofs, being recognized wherever used as comparable in quality with the best of slate and hard burned clay. The elimination of the wood shingle by ordinance in practically all of the larger cities and in hundreds of the smaller places has directed public attention to better roofings with a decided trend toward concrete.

Colors usually selected for concrete tile are red, green, gray, brown, buff, blue and variegated, the popularity of each being about in the order mentioned. This range of color is greater than obtainable in most other roofings and with it must be included the many pleasing variations obtained by mixing tile of two or more colors.

Marketing Possibilities

Concrete roofing tile is a product which can be sold successfully by a direct advertising campaign to the public. If the manufacturer is also a roofing contractor, snappy direct advertising through the columns of the best local papers is bound to bring big returns. The product has so many strong sales arguments that it is quickly salable everywhere if only an attractive method of presentation is used.

The market for concrete roofing tile is not limited to new building by any means, but can be extended to thousands of old roofs—wherever the framing is sufficiently strong or can be easily strengthened.

The manufacturer who is not a roofing contractor will probably find the most satisfactory method to be by direct sale to contractors. If established contractors can be prevailed on to take a large output regularly, this method may be the easiest

The excellent architectural effect of concrete tile roofing is shown by these pictures. Note the straight hips and valleys due to the uniformity of the product

and provide an outlet at the lowest sales cost. But it must be remembered that in such case the manufacturer may tie himself up disastrously if his output goes to a concern unsound financially or without the incentive to push for new business aggressively.

It is occasionally difficult, in a locality where concrete tile is unknown, to get contractors to use the new material. Under such circumstances manufacturers have frequently organized subsidiary roofing companies to sell and lay complete roofs. After a short period of demonstration, concrete tile roofs are in such demand that roofers become interested and purchase the material direct. Direct advertising methods are nearly always effective during the early stages in the introduction of the material, and usually thereafter.

Ordinarily, it costs $1 to $2 per square

The method of laying concrete roofing tile is well shown in this close-up detail

to load and haul tile from the plant to the job and where it is to be applied to tight board sheathing covered with a good grade of roofing felt, the cost of material and labor for laying the felt and necessary wood strips which hold the tile on the roof will be from $1 to $1.50 a square. The cost of labor for laying the tile will vary from $4 to $6 per square, according to wage scales and labor efficiency.

Red or gray concrete tile roofs in place commonly sell for from $18 per square up. Green colored tile usually brings $5 per square more than red or gray tile. This difference in price is due to the cost of quality of pigments necessary to secure a satisfactory green color.

Available Equipment for Manufacturing Roofing Tile

A range of very satisfactory equipment is offered by manufacturers of roofing tile machines. Several of the smaller type hand machines are particularly desirable where the output at the start is expected to be quite limited; they are also very desirable for use in making the limited number of "specials" required in connection with the production of the regular tile in power machines. Under certain conditions hand operated machines have made very economical showings even for a large quantity production.

Automatic power operated machines are destined to predominate eventually by reason of the smaller space required and saving of labor effected by their use. Power equipment is also desirable because it helps, perhaps more than any other factor, to remove variations due to irregularities of the different workmen, making a product much more likely to be uniform.

Quick Setting "Electric Cement" Fused in Electric Ovens

Initial Set Occurs in Two Hours and Crystallization is Complete in Four or Five Days

A COMPARATIVELY new variety of cement, which is a French invention that is creating greater attention owing to the useful property of quick hardening. While the material is comparatively new to this country, it was first under experiment in France in the year 1908, and, six years later, it was employed in public works in that country under the direction and supervision of the French state engineers. The outbreak of war hindered further development of its use, but since 1919 electric cement has become increasingly popular, and the demand upon the manufacturers has latterly become somewhat severe.

Electric cement is obtained from the fusion, in an electric oven at a temperature of 1458 C., or, in a vertical water jacket oven with coke as fuel, of a certain mixture of alumina, silica, iron and calcium, the system of manufacture thus differing from that employed for ordinary portland cement, in which the ingredients are calcinated. The chemical composition of the cement is such that no trace of free lime is present, and the material is, therefore, particularly for concrete marine work or where attack from sulphurous water is possible. The initial set occurs in about two hours, and the final set in from four to five hours, and, immediately after the final set has taken place, the cement increases in strength so rapidly that within 24 hr. the resistance to compression and tension is considerably in excess of that of ordinary portland cement after 28 days. Crystallization, which, in the latter cement, takes from five to six weeks, is, with electric cement, practically complete within a few days. A noticeable rise in temperature thus occurs.

The tests which have been carried out with electric cement and River Seine gravel and sand reveal some remarkable results. Neat cement, in tensions, gave 550 lb. per square inch after 24 hr., increasing to 845 lb. after 48 hr., and to 1050 lb. after 28 days. In compression, the results for similar periods were 6700 lb., 7737 lb. and 12,000 lb. respectively. Cement and sand mixed in the proportion of 1 to 3 showed in tension 412 lb. per square inch in 24 hr., 446 lb. in 48 hr. and 557 lb. in 28 days. Concrete composed of 1 part electric cement, 3 parts sand and 6 parts gravel withstood, after 72 hr., a compression of 4400 lb. per sq. in.

These high standards of strength, combined with the property of quick hardening, tend to render electric cement particularly useful for reinforced concrete work. It is understood that ferro-concrete piles in which this material has been employed have been successfully driven three days after molding, while large size beams and slabs, tested to destruction within three days of their molding, have given better results than those of the usual type after 90 days. The economy in forming, in the use of plant generally, and in the time of erection, is thus obvious, and such economy is one of the factors in reinforced concrete work.

Electric cement demands no special method for its use, but it must be handled and mixed with tools and plant which have been thoroughly cleansed. Mortar and concrete should be mixed in a plastic condition, water being added from a spray. All forms must be well wetted before the concrete is deposited, more care being taken in this direction than is usually necessary with ordinary cement. Two hours after mixing, the concrete should be sprayed with water to keep it moist, an operation which should be repeated two or three times during the ensuing 12 hr. At the end of this period the concrete should be freely watered, a further watering being given after another 12 hr. A mixture too rich in cement is undesirable, and a proportion of 5½ cwt. of cement to a cubic yard of aggregate and half a cubic yard of sand will generally meet requirements. Molding should, of course, as in all reinforced concrete work, be continuous. If a joint is imperative, the concrete should be permitted to set. The joint should then he well roughened, brushed with a wire brush and thoroughly cleansed before the new concrete is deposited. If these methods are adopted, it will be found in most cases that the forms and supports of the floor panels can be removed 24 hr. after the concrete is deposited.—*British Stone Trades Journal.*

German Limestone Production and Sales

RAW limestone to the amount of 10,200,000 tons was broken up in Germany in 1922, according to the Limestone Union. Out of this quantity, 2,400,000 tons were sold raw, while the rest was further worked up in refining works.

Production was divided between 633 works, employing about 25,000 persons. The output reported for 1922 was as follows:

	Metric tons
Quicklime	4,354,000
Fat lime in lumps (acetate)	2,800,000
Other lumps	777,000
Ground quicklime	777,000
Sinter dolomite	161,000
Marly limestone	689,000
Ground raw limestone	115,000

General view of the plant, taken from the railroad track at the back. The piles of rock are a part of the reserve stock of which a considerable amount has to be carried in storage

Australian Gypsum Plaster Mill

Makes Plaster of Rock Gypsum Brought in 200 Miles and Pebble Gypsum Which Is Washed to Free It From Clay

By Geo. W. Limb
Of Victor Electric Plaster Mills, Kensington, Victoria, Australia

OUR gypsum is quarried in open quarries. The method used is very much the same as those used in the United States, though, of course, on a much smaller scale. We are working two pits at present, one a rock gypsum, which is taken straight out of the pit and loaded into railway cars for delivery at mill, a distance of 200 miles. The other is a granular crystal gypsum, the formation of which closely resembles small pebbles which vary in size from that of a pea to as large as an egg. This pebble gypsum is found in beds mixed with about 40 per cent of clay and sandy soil.

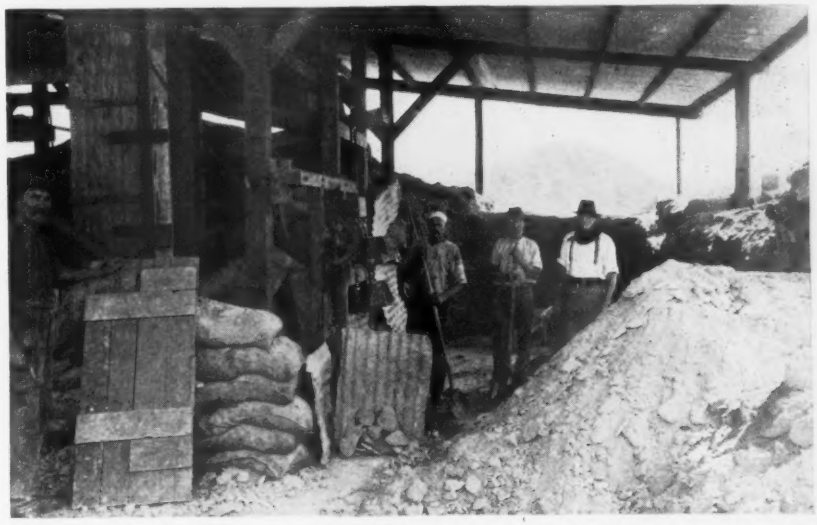
Clay and Impurities Washed Out

The clay and other impurities are washed out, "before trucking," over a series of screw conveyors and screens with artesian well water, of which there is a good supply (although we have had no rain in this district for eight months). On reaching the mill both gypsums are mixed together and put through a crusher which reduces the whole to about ½ in. From the crusher it is elevated to a washing machine which gives it a final and thorough wash.

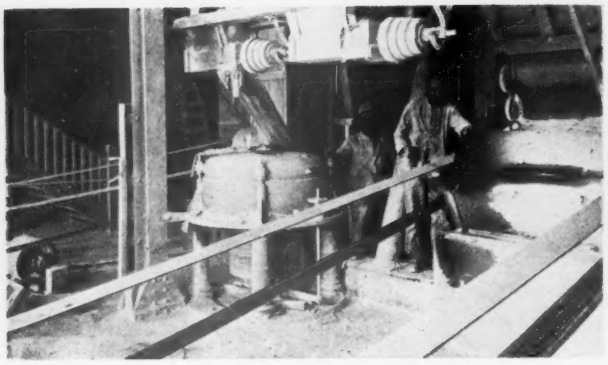
From the washer it is allowed to drop in a pile to drain. There are three piles so that each day's wash has two days in which to drain before being conveyed to the dryer. The dryer is a 30x4 ft. revolving cylinder with two fires, one at feeding end and one about the center. The whole is enclosed in brickwork. A 3-ft. fan draws the hot gases through the cylinder and discharges into a dust chamber above.

The dried gypsum is then elevated to a bin above a pulverizer which reduces it to about 60-mesh at the rate of eight tons per hour. From the pulverizer it is conveyed to the kettle bins. We have two 8x8 ft. kettles, each with a capacity of eight tons finished. From the kettles the product is conveyed to another pulverizer which regrinds the whole to about 95 per cent through 100-mesh. After pulverizing the second time the plaster is conveyed to the bin over the mixer, or direct to plaster bin, for bagging.

The mixer is a five-spout Broughton with which we mix our wall plasters,



Interior of the washing shed. The crusher is set below ground and the screw washers, which wash the pebble gypsum, are in a wooden frame above. What looks like a mountain in the background is a stock pile of crude material



Left, a part of the grinding room showing buhr stones and part of two pulverizers. The stones are used only in an emergency. Right, Mr. Limb and a group of the employes of the plant

namely "Victor Hard Finish" and "Victor Cement Plaster." Each machine is driven with a separate electric motor. The plant has an output of approximately 70 tons daily. No doubt this will seem to you a very small output for a plaster mill, but as there are six other plans of varying capacities operating in the commonwealth and we have a population of only 5,000,000, you will find that we produce proportionally as much plaster as the United States. We have introduced every labor saving device possible in our plant so that the material is not handled from the time it leaves the draining pile until it is bagged finished.

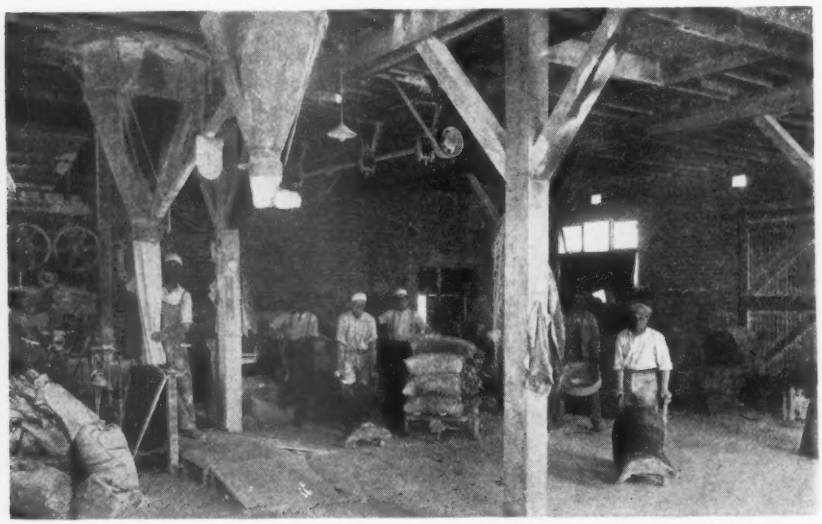
In the picture of the washing shed portion of our reserve stocks of gypsum in stock pile behind men, we always carry a reserve of about 5000 tons.

South to Produce Bauxite

BOTH white and red bauxite are found in large quantities in Henry county, Alabama. They are said to be the largest deposits of bauxite ever discovered in the Southern states. This bauxite was discovered by representatives of the Republic Mining and Manufacturing Co. and the Georgia Co. of Birmingham, Ala. These companies have men investigating other lands in that section of the state and are taking leases on lands that contain promising deposits of bauxite. It is learned that they now have under lease more than 1000 acres of bauxite lands and that they expect to begin developments on a large scale as soon as they acquire all the leases desired.

A Five-Shift Week

MORE than one operator in the zinc-lead district centering at Picher, Okla., says that he is milling three-fourths as much ore and getting a higher percentage recovery in five day-shifts per week than he did when running twelve shifts—six day and six night. The statement seems pretty hard to believe, but the reasons assigned are convincing. Various views that we have long held are substantiated. Some of the advantages of the five-shift program are: (1) Night work is virtually eliminated. There never was a crew of men who would do as much and as good work at night as when the sun is up. A few individuals may be as efficient from 10 p.m. to 4 a.m. as in the day time, but, by and large, day work is far the best. (2) Repair work around the mills is done on the sixth day. To get the best results from a concentrator the equipment should be given periodic inspection, and overhauling when found necessary. Under the present plan of operation in Oklahoma the machines are kept in first-class repair, and when they are running they do their maximum work. Under constant operation individual machines or units are always being shut down, thereby throwing units of the plant out of step, so to speak, and causing less satisfactory recovery. (3) "Laying off" is minimized. One of the difficulties about operating a comparatively small plant is the habit of many men to take a personal holiday every now and then without saying anything beforehand.—*Engineering and Mining Journal-Press.*



View of the bagging and storage room. The mixer is shown at the left. Every labor-saving device possible is introduced in this plant so that the material is not handled from the start of the process until it is put in bags

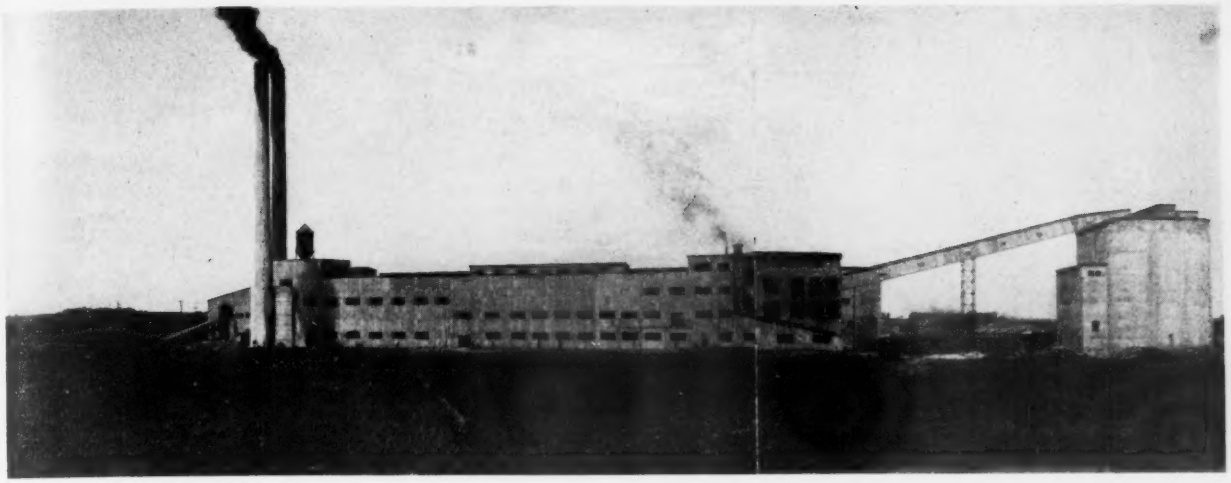
Electrocuted While Lining Tube Mill

A FATAL accident occurred at the Brixment mill at Speed, Ind., when George Riggle, 33 years old, received an electric shock while working in a tube mill. Together with Warren Bottorff he was drilling holes in the iron shell of a tube mill to replace the silex liners with cast iron plates. The electric drill they were using shorted and both men received an electric shock. Th fuse on the line blew out cutting off the current and releasing them. But George Riggle was dead. The prone pressure method of resuscitation was tried but was unsuccessful.

Riggle had been married only a few weeks. He is survived by his wife, his mother, five brothers and two sisters.

George Riggle had a splendid record in the World War, and was decorated for bravery by both the American and British governments.

This unusual accident ought to serve as a warning to those using electrically driven machines around machine parts that contain large masses of iron.



The plant of the Pyramid Portland Cement Co. at Valley Junction, Iowa. It has an annual capacity of 1,000,000 bbl. and is one of the most modern wet process cement plants in the country

Pyramid Cement Plant Completed

Wet Process Plant with 1,000,000 Barrel Capacity—One of Most Modern in Country—Steel and Concrete Construction Throughout—Compactness and Simplicity of Operation a Feature

By Charles A. Breskin

THE plant of the Pyramid Portland Cement Co. at Valley Junction, Iowa, just on the outskirts of Des Moines, has finally been completed and clinker was made on August last. The construction on this plant has been going on for the past two years and its completion makes the city of Des Moines a real cement center, with a yearly production of over 2,000,000 bbl.

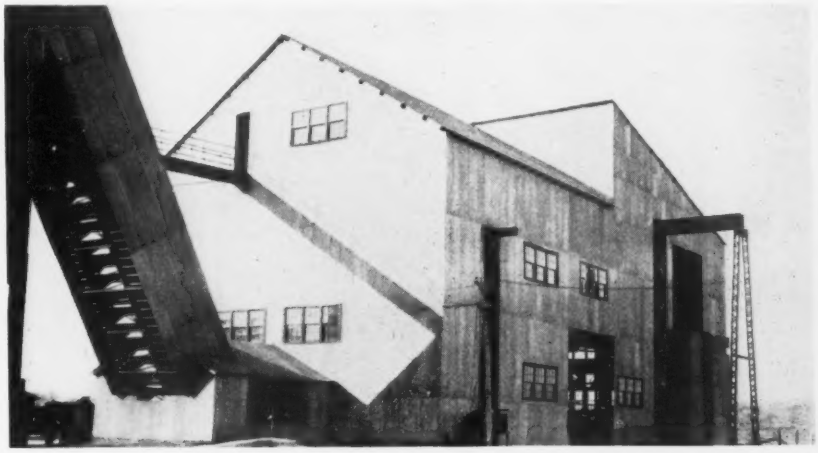
The Pyramid Portland Cement Co. was founded and organized in the fall of 1919 to meet the rapidly growing demand for portland cement in Iowa and the expanding mid-West. The organizers realized the inability of the then existing plants to furnish the volume of cement that would be demanded during the years to come. From Des Moines on west to the Rockies and northwest to Canada there were only a few far-scattered cement plants.

Dealers and contractors were having difficulty in obtaining cement. In addition, road building programs were being laid out which would require millions of sacks of cement. A third factor was looming up—the ever-increasing realization among farmers that cement formed the best possible building materials for farm purposes.

Des Moines was chosen as a site for the plant because of its proximity to the coal bearing fields and situated as it is, the labor supply problem would not be as serious as with those plants located in outlying districts. Furthermore, Des Moines offered exceptional railroad facilities and was a logical center from which cement can be distributed to a large territory. Within immediate proximity of the plant site at Valley Junction was located a good clay deposit, which would furnish the silica and alumina contents for the cement. The quarry was located at Gilmore City, Iowa, about 100 miles northwest from Valley Junction. This furnished the limestone necessary. The other ingredient, gypsum, could be obtained at Fort Dodge, only 50 or 60 miles from the plant site.

Quarry

The property at Gilmore City comprises some 80 acres of land underlaid with a ledge of limestone over 200 ft. thick. The stone



The crushing plant contains a rotary car dumper, a No. 18 gyratory crusher and a No. 9 hammer mill, with all necessary elevators, conveyors and bins

Belt conveyor delivering stone to storage building. It is fitted with an automatic tripper and delivers at any desired spot

here tests better than 98 per cent calcium carbonate. "Cyclone" well drills are used for blast holing. After blasting, the rock is loaded into standard gondola cars by a 100-ton Bucyrus steam shovel with a 3½-cu. yd. dipper. At present capacity the quarry equipment can load 20 such cars every half day.

The rock is shipped from Gilmore City to Valley Junction over the M. & St. L. railroad. The cement company has secured a 20-year contract from the railroad which gives it special rates on limestone shipped between those two points. A minimum of 7000 cars of rock will be shipped every year.

The Crushing Plant

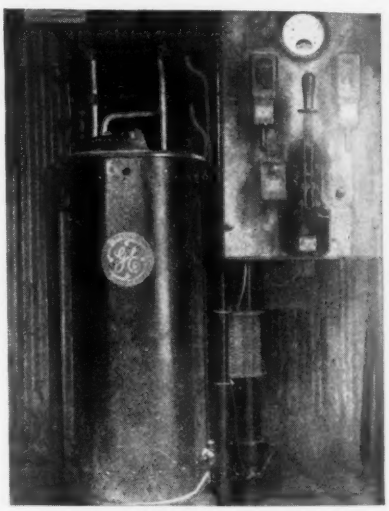
When loaded cars of limestone reach the plant at Valley Junction, they are shunted onto a spur where they await the company's own locomotives to take them to the dumping machine. One car at a time is hauled up an inclined tramway at one side of the crushing plant and put on a rotary car dumper by means of a Clyde two-drum electric hoist located in the crushing plant. The car dumper, manufactured by the Chicago Car Dumper and Equipment Co., is located directly over the initial crusher and is operated by a 10-hp. motor. A 50-ton car of rock is dumped with comparative ease, as it is only necessary to supply sufficient torque to overcome the initial inertia.

The initial crusher is a No. 18 McCully gyratory and is set in a concrete pit 32 ft. deep. As the limestone is crushed it is reclaimed by a Stephen-Adamson bucket elevator, 54 in. wide, 60 ft. centers and set at an angle of 45 deg. The elevator deposits the crushed material to a steel hopper feeding a No. 9 Dixie hammer mill. The hammer mill and initial gyratory crusher are belt driven from a 300-hp. G-E induction motor.

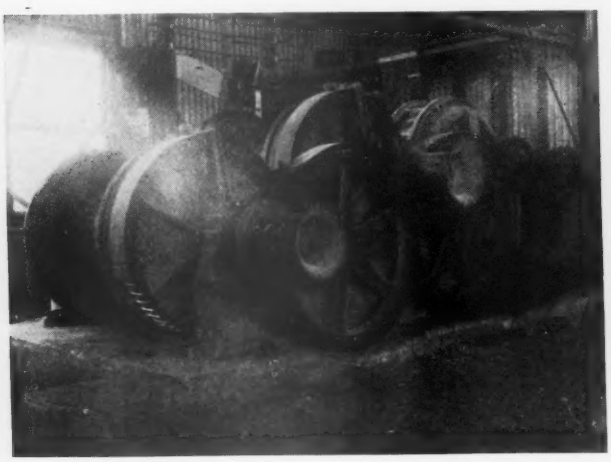
The hammer mill reduces the rock to 1½-in. size. It is reclaimed by another 54-in. bucket elevator and deposited into a hopper feeding either a rotary screen, when stone for commercial needs is required, or a 36-in. belt of 220-ft. centers, with an automatic tripper which deposits the material into the stone storage.

The commercial stone plant is only a side line, but inasmuch as there is considerable demand for crushed rock around Des Moines it was well warranted. The stone screen is 5x30 ft., made up of a 12-ft. section with 1½-in. perforations, a 10-ft. section with 2-in. perforations and an 8-ft. section with 3-in. perforations. There is also a dust jacket with ⅜-in. perforations. The sized stone from the screen sections is discharged to six bins below having a storage capacity of 300 tons each. Cars and trucks will be loaded underneath the bins. The crushing and screening plant is of steel and concrete construction throughout.

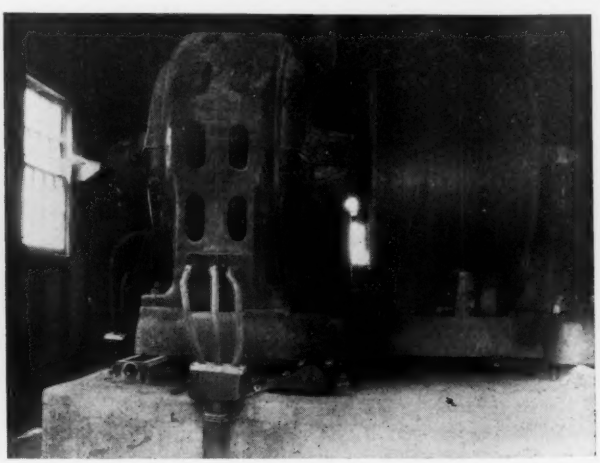
Shale is brought in on gondola cars and



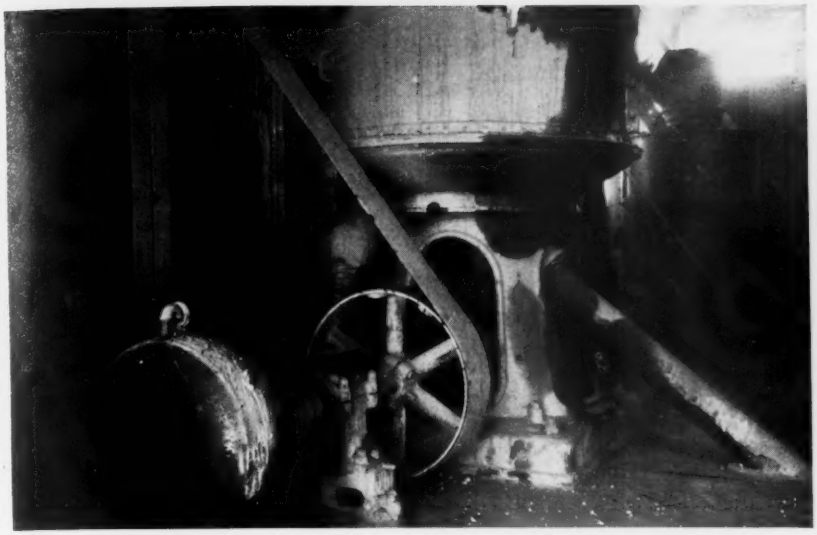
Drum controller and instrument board for motor driving initial gyratory crusher and hammer mill



This two drum electrically powered hoist is used to haul cars up incline and spot on rotary car dumper



A 300-hp. motor drives the initial gyratory crusher and hammer mill. It is fitted with a Lenix drive



Two Trix separators are located on the raw end. They take discharge from Kominuters and separate slurry so that fines go to tube mills and coarse is returned to Kominuters

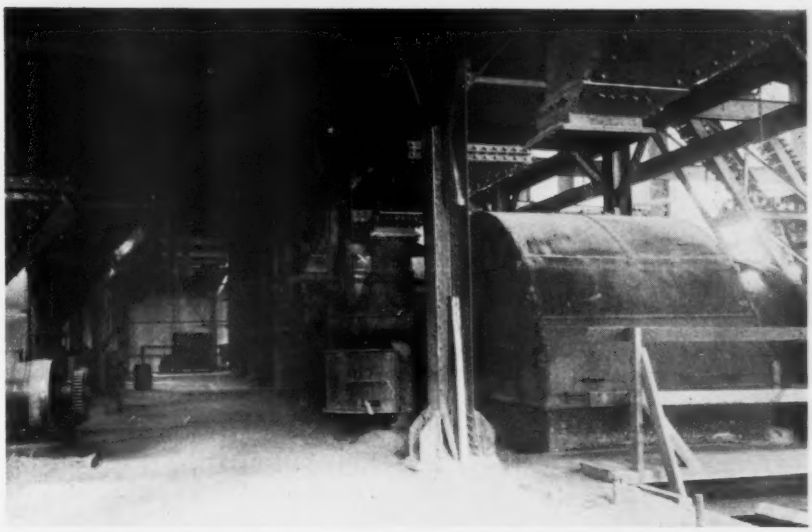
unloaded by an 8-ton Milwaukee overhead electric traveling crane with a 3-yd. Orton-Steinbrenner clam shell bucket. The crane has a span of 78 ft. and travels the entire length of the 400-ft. storage building. It also unloads coal and gypsum, delivered in gondola cars and distributes to proper places inside the storage building. The storage building will hold 15,000 tons of stone, 5000 tons of shale, 100,000 tons of clinker, besides holding proportionate amounts of coal and gypsum. As can be noted from the accompanying drawings, the stone and shale storage piles are adjacent to each other, as is the clinker and gypsum.

Raw Grinding

Underneath the rock and shale storage is a tunnel with a 20-in. conveyor belt of 78-ft. centers. The sale and rock is deposited on this belt conveyor through automatic feeders at the top of the tunnel. This proportions the material. The belt conveyor discharges to a 18-in. chain bucket elevator of 72-ft. centers, discharging to bins ahead of two wet grinding Kominuters. Each Kominuter contains 12,000 lb. of 5-in. steel balls, which further crush the stone and shale and mix it with water. The Kominuters are each belt driven from 150-hp. induction motors.

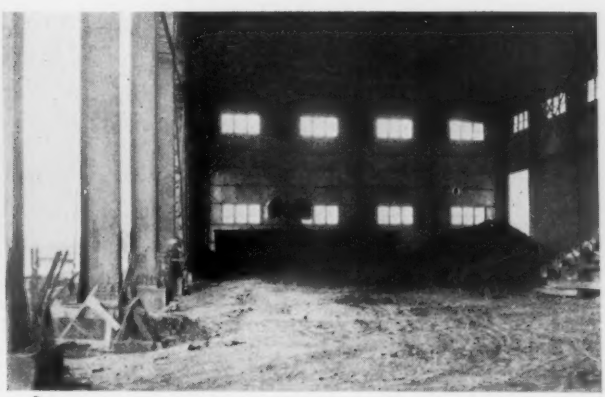
The discharge from the Kominuters is recovered by a steel encased bucket elevator which discharges to two Trix mills, which are separators for the grading of mineral substances in a wet condition. The Trix operates on the principle of centrifugal force. Being fed from the top, the material descends and is caught by a series of hollow rotating arms which throw the material against a cylindrical stationary screen. All particles passing the screen opening are of a proper size for feeding to a tube mill. The coarse material rejected by the screen is returned to the Kominuter for further grinding. The Trix separators are each driven from 10-hp. motor through a Foote spur gear reduction unit.

The discharge from the Trix separators goes to an agitating trough ahead of a 7x22-

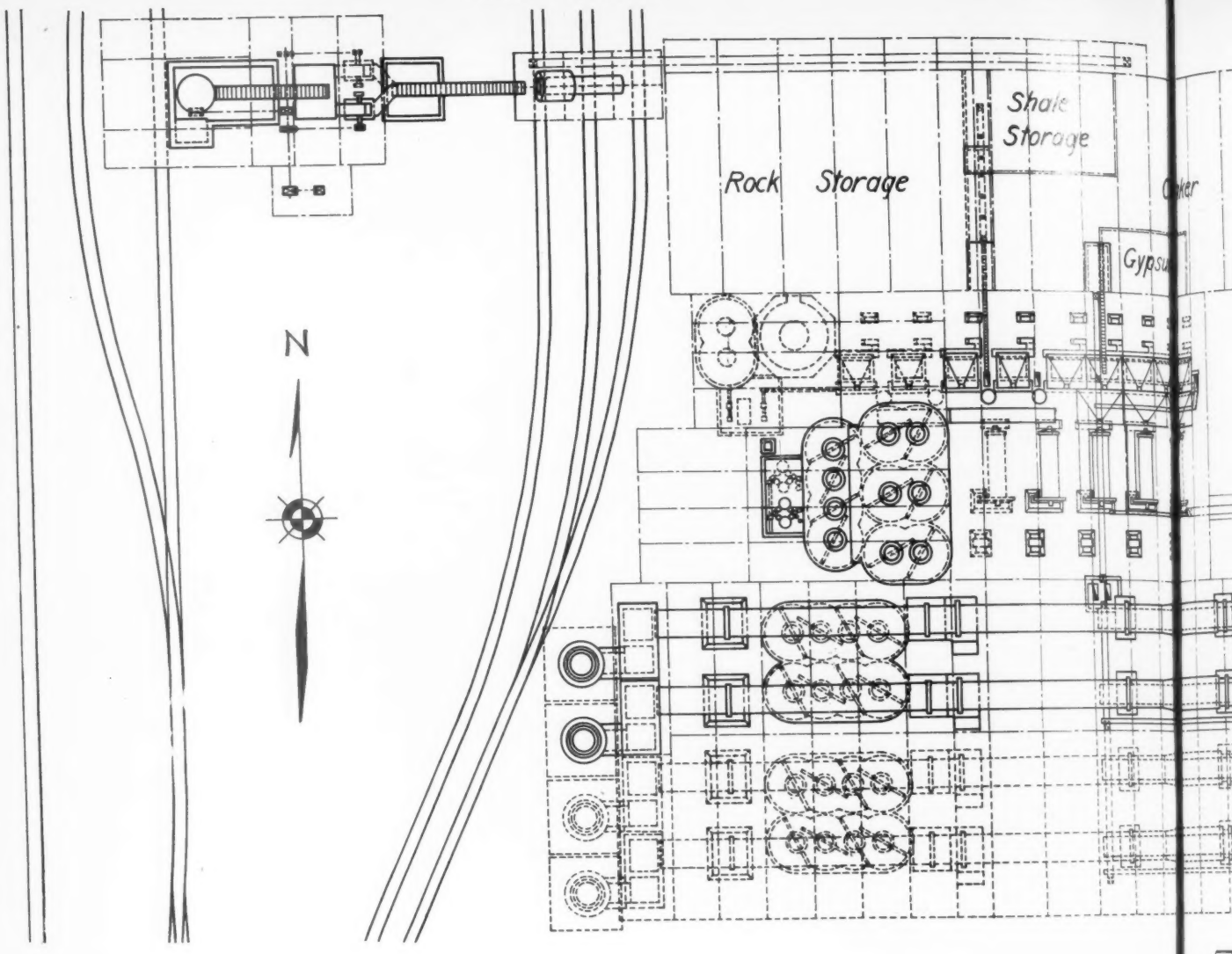


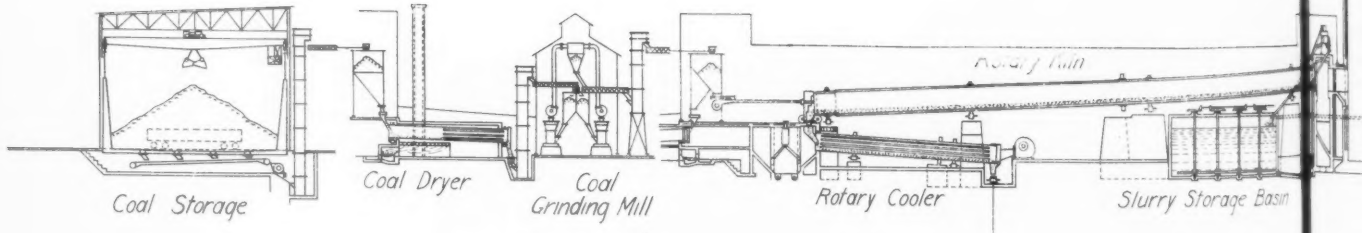
Battery of five Kominuters; two do raw grinding and three finish grinding. At extreme left is shown feed to tube mills

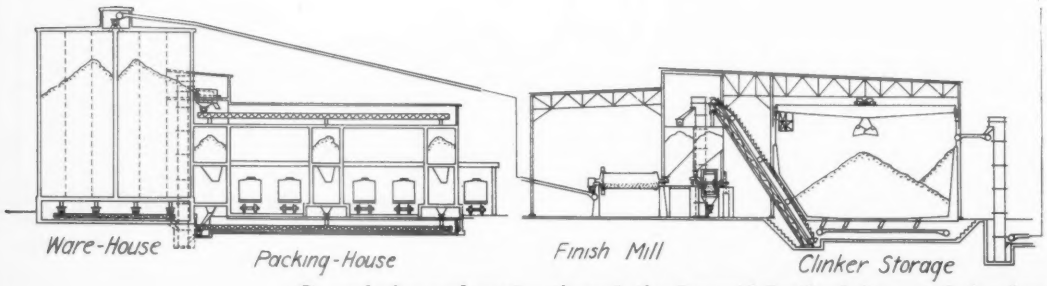
Stone storage has a capacity of 15,000 tons. It is recovered by a belt conveyor located in a spacious concrete tunnel underneath stone storage. Stone is drawn out by automatic feeders. Photograph taken at night



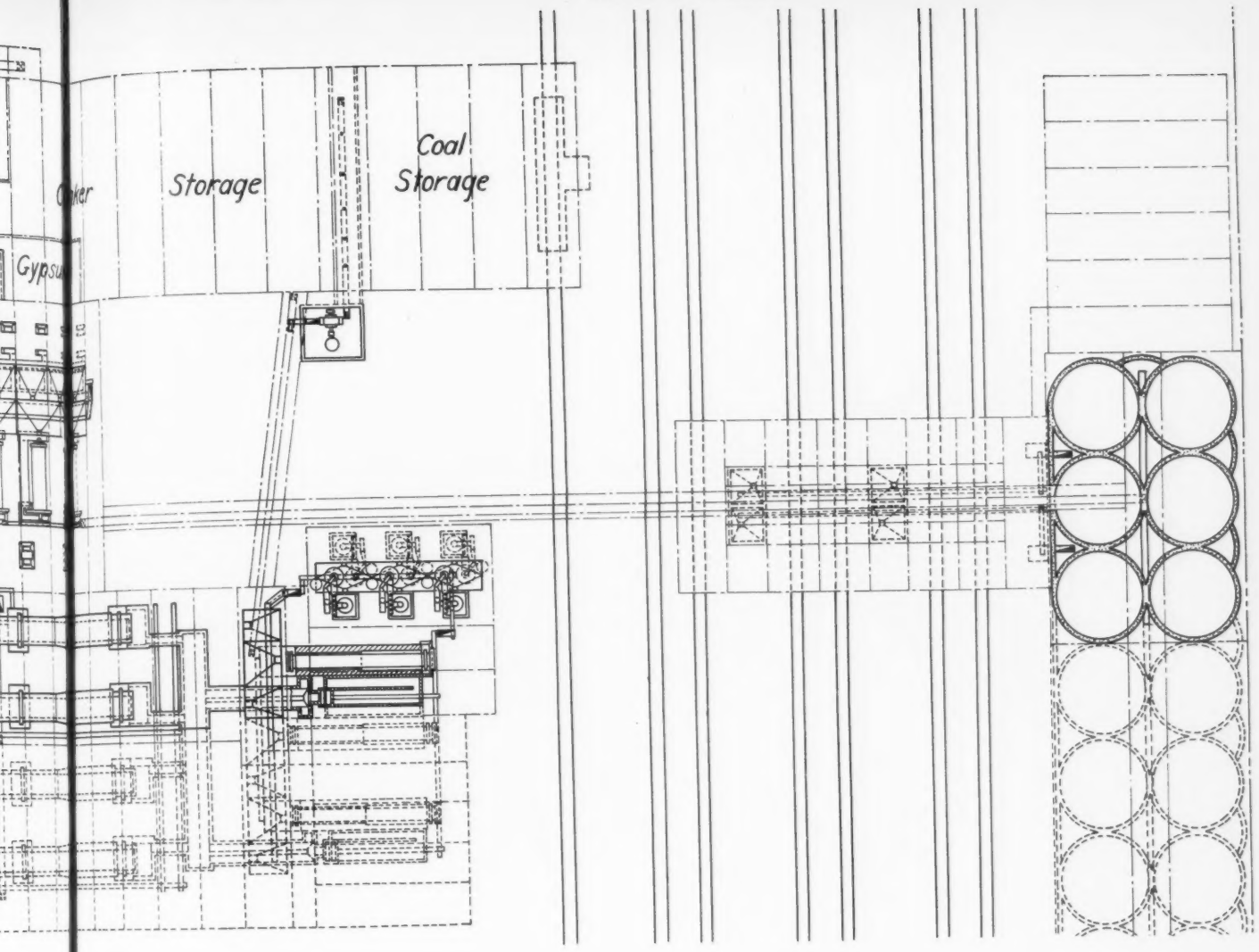
An 8-ton overhead electric traveling crane with a 3-yd. grab bucket unloads coal and shale and distributes in huge building which is 78 ft. wide and 400 ft. long. This is also a night photograph

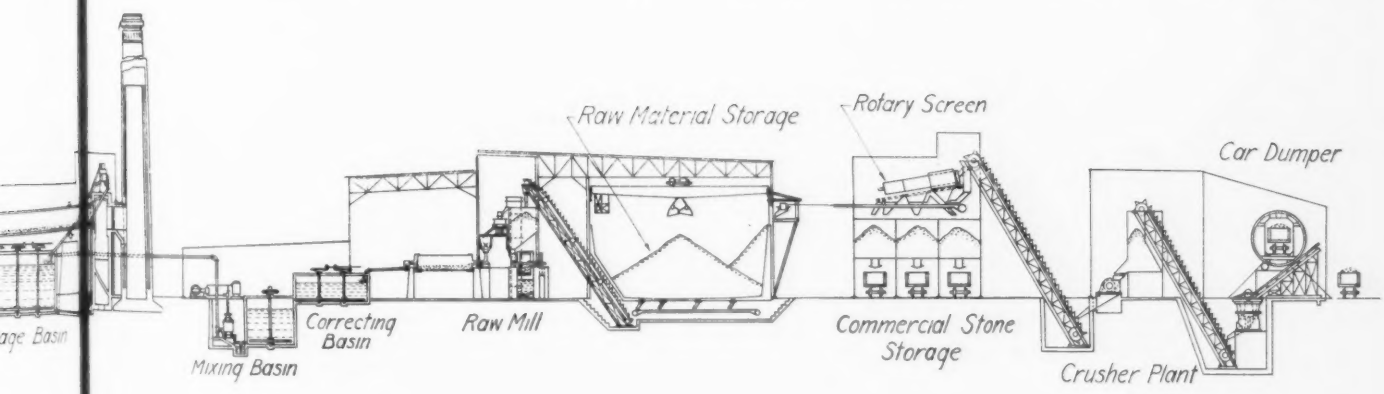


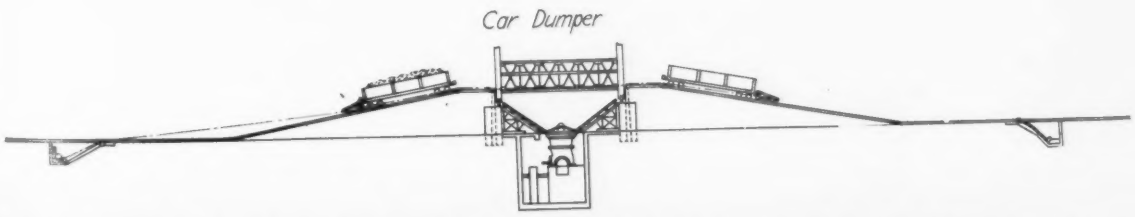




General plan and section through the Pyramid Portland Cement Co.'s plant at Des Moines. The sectional view is worth







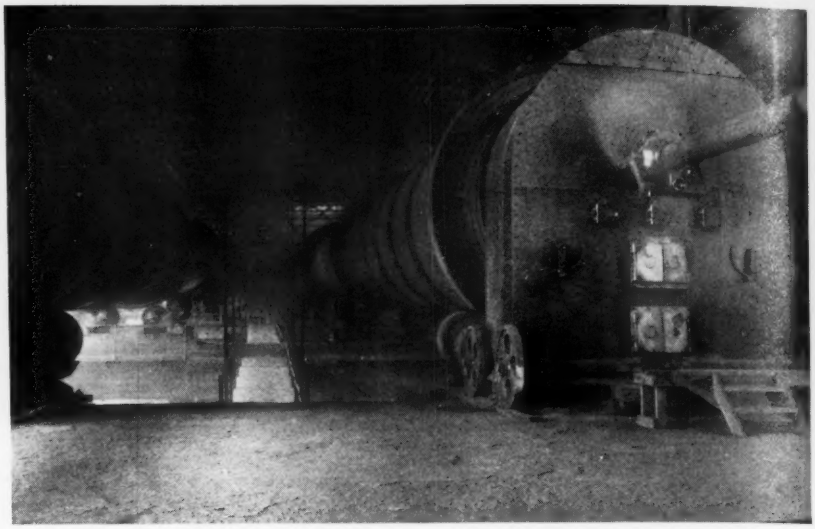
sectional vie worth especial attention from the fact that it contains a full flow sheet of the process of making portland cement

ft. Smidth tube mill, belt driven from a 400-hp. motor fitted with a Lenix drive. The tube mill is lined with jasper stone and contains 63,000 lb. of 1¼-in. steel balls revolving at a rate of 20 r.p.m. The tube mill does the final raw grinding and its discharge, slurry, is delivered by gravity to three correcting basins holding 600 bbl. each.

The chemist secures an analysis of a filled basin during the time the slurry from the tube mill is being discharged to another unit. Adjustment of the composition to the correct chemical analysis is made by drawing from the correcting basins measured quantities of known composition in the right proportion to give the proper mix and afterwards mixing them together by discharging by gravity into agitating or mixing basins. The correcting basin agitators are driven by a 5-hp. motor through a Foote spur gear reducer.

The correcting basins have a 2000-bbl. capacity. It is a quadruple unit and has four agitators driven from one shaft by a 15-hp. motor through a Foote spur gear reducer. From here the slurry is pumped by means of an air-lift pump to the storage basins under the kilns holding 2700 bbl. The storage kiln feed basis is also a quadruple unit with four agitators driven from one line shaft by a 15-hp. motor through a Foote spur gear reducer. The slurry from the storage basins is pumped out by Smidth plunger pumps of which there are three, each driven by a 10-hp. motor. It is delivered to the kilns through a Smidth slurry feeder.

The Pyramid plant is one of few that has installed plunger pumps for transfer of slurry from storage basins to kiln feed. Heretofore, this has always been accomplished by elevators, air-lifts, centrifugal pumps. The plunger pumps installed here are said to give a uniform steady flow of slurry wholly uninfluenced by variations in head, suction or discharge. Another advantage is in its cleanliness and comparative avoidance of slurry spilling.



The rotary kilns are 10 ft. in diameter and 240 ft. long. Each has an enlarged 60-ft. section at the firing end, 11 ft. 3 in. in diameter

Kilns and Coolers

There are two rotary kilns, each 10 ft. in diameter and 240 ft. long, with an enlarged 60-ft. section at the firing end. This section is 11 ft. 3 in. in diameter. The kilns are insulated with Sil-O-Cel brick starting 50 ft. back from the firing end and for 130 ft. after that. Standard fire brick is used for kiln lining. The kilns without lining weigh 675,000 lb. each.

The clinker from the kilns is discharged to two 7x70-ft. rotary coolers. From here it is discharged to a belt conveyor and taken to the finish grinding department or to the clinker storage. The coolers are known as pressure coolers, fans being used to blow air into the cooler, thus cooling the clinker. Fans are provided for at the feed end of the coolers. The purpose here is to blow air in between cooler shell and lining. This keeps the device cool and prevents warping. The chamber between kilns and cooler is sealed. Each kiln has a 216-ft. reinforced concrete stack built by the Weber Chimney Corp.

Three tube mills, each 7x22 ft., do the final grinding in both raw and finish ends. One mill is in raw end and two in finish end for clinker grinding

Coal Pulerizing

Coal is brought into the storage building in gondola cars and unloaded by the overhead electric traveling crane. Before unloading cars are weighed on track scales. As in case of stone and shale, the coal is deposited on a belt conveyor located in a spacious concrete tunnel underneath the coal storage. The belt conveyor is fitted with a 24-in. Dings magnetic pulley which removes all tramp iron. The coal discharging over the magnetic pulley goes direct to a small Dixie crusher, where it is reduced to a size suitable for drying. The discharge is reclaimed by a bucket elevator and screw conveyor and deposited in a bin ahead of a 6x50-ft. Cummer coal dryer.

From the dryer the coal goes by bucket elevator and screw conveyor to bins ahead of three Raymond coal pulverizers. It is ground fine enough for kiln feed and conveyed to bins ahead of the kiln. A Smidth coal feeder and a "Sirroco" blower inject the powdered coal into the kiln.

Finish Grinding

The clinker from the storage building is recovered in the same manner as the stone, shale and coal. Gypsum is added in proper proportions and the mixture is fed to a battery of three Kominuters. These are identical to "raw" Kominuters except that grinding is done dry. Each Kominuter has a charge of 12,000-lb. 5-in. balls and is belt driven from 150-hp. induction motor. The discharge from Kominuters is reclaimed by bucket elevators and deposited in a bin ahead of two 7x22-ft. Smidth tube mills. Each tube mill is charged with 63,000 lb. of

Coal injector and blow just ahead of the rotary kilns

1½-in. steel slugs and is belt driven from a 400-hp. motor. The belts are fitted with Lenix drives.

The discharge from the tube mills is taken by a troughed belt conveyor, approximately 375 ft. in centers, and deposited to the cement storage silos. There are six silos each 32x80 ft. with a total storage capacity of 110,000 bbl. Adjoining the silos is the packing plant. This is 52 ft. above ground level, 15 ft. wide and 60 ft. in length. Two three-valve Bates machines are used for packing cement. Tracks for cars are laid alongside the packing plant.

It can be noted from the accompanying drawings that ample provision has been made everywhere for future expansion. The placing of grinding equipment between kilns and storage makes for a minimum amount of labor. The plant is also equipped with machine shops where spare parts can be made. In the same building is the store room, chemist's laboratories and plant offices.

Power is purchased from the Des Moines Electric Co. It is received in the company's transformers at the plant at 44,000 volts and is reduced to proper operating voltage. The transformer station consists of three 1250 kv-a. transformers and three 200 kv-a. transformers. A complete electrical repair department is maintained at the plant to prevent possible tieups in the event of short circuits and like occurrences.

Two Ingersol-Rand air-compressors supply air for the air-lift slurry pumps and for air agitation of slurry in the various basins. A plunger type deep well pump supplies water needed in the plant. A 30,000 gal. steel water tank, 100 ft. high, is provided for on the grounds.

The entire steel and fabricating work on the Pyramid plant was done by the Pittsburgh-Des Moines Steel Co. The initial gyratory crusher, kilns and coolers by the Worthington Pump and Machinery Corp., the Kominuters, tube mills, mixing, correcting and kiln feed basins, coal feeders and Lenix drives by F. L. Smidth Co., coal pulverizers by Raymond Bros. Impact Pulverizer Co., conveyors and bucket elevators by Stephens-Adamson Mfg. Co., design of warehouse and packing plant by Bland Engineering Co., construction of packing plant by Chas. Weitz Construction Co., all gear reduction units by Foote Bros. Gear Co., motors by Allis-Chalmers Mfg. Co. and General Electric Co., firebrick by Walsh Fire Clay Products Co., insulation by Celite Products Co.

The president of the Pyramid Portland Cement Co. is E. Struckman. Mr. Struckman was largely responsible for the design of the plant and the construction was carried on under his personal supervision. He has active charge of the production end of the concern.

Mr. F. H. Mackanan is chairman of the board of directors and has charge of sales and financing.

Coal-Storage Survey Nears Completion

Examples of Successful Coal Shortage, Which, if Generally Adopted, Will Solve Problems of Car Shortage

MEMBERS of the F. A. E. S. Committee on Coal Storage met in Chicago on August 27 and 28 to collate reports on different phases of the work which they have been carrying on during the summer.

The loss due to weathering has frequently been given as an argument against coal storage. Dean S. W. Parr of the University of Illinois, a leading authority on the chemistry of coal, gave facts proving that coal suffers only a slight deterioration in calorific value by exposure to air. Twelve years' experience with coal storage at Urbana has shown him that even the most volatile of central Illinois bituminous coal can be stored with but little loss, if proper methods are employed.

Methods in dock and pier storage, other than "head-of-the-lake" storage, were described by O. P. Hood, chief engineer of the United States Bureau of Mines. His statement included a report on storage by the federal government, with specific references to the army and navy and the Panama canal.

A report on Duluth and Superior storage, where the greatest and most efficient storage plants in the world are located, was made by W. H. Hoyt, chief engineer of the Duluth, Missabe & Western railway. Many recommendations of the committee will be based upon methods employed at these plants, which during the last coal year stored approximately 12,000,000 tons of bituminous and 1,500,000 tons of anthracite coal.

Among other special reports presented were the following: Mine Storage Location, by W. J. Jenkins, vice-president of the Consolidated Coal Co., St. Louis; Economical Use of Stored Coal, by David Moffat Myers, consulting engineer, New York City; Development of Storage Possibilities in Chicago, by E. S. Nethercut, secretary of the Western Society of Engineers, Chicago; Anthracite Storage, by R. V. Norris, consulting engineer, Wilkes-Barre, Pa., and Items of Transportation, by Roy V. Wright, editor of *Railway Age*.

The coal-storage survey represents one of the biggest concerted efforts of engineers that has ever been made in this country. Over a hundred sub-committees were formed for making local studies in cities in every state in the union. These committees, consisting for the most part of five members each, are composed of leading local engineers representing national and local engineering societies and the various branches of the engineering profession. Operators, railway officials and distributors have co-operated with the engineers, enabling them to assemble detailed information on the production, distribution, marketing and consumption of coal. So far as possible the work of the local committees has been systematized by the use of a standard outline for their procedure and a questionnaire for the solicitation of information from different industries.

Dean P. F. Walker, field executive of the committee, who has been in close contact with the work of these sub-committees in many of the principal industrial centers of the United States, reported widely varying conditions, necessitating in many cases individual study and processes for the solution of the problem. Dean Walker advocated the establishment of large coke plants in industrial centers which would provide a substitute for anthracite and also supply cheaper gas for such communities. This plan would greatly facilitate storage, since coke is safe from spontaneous combustion, and would be of great value to the small consumer, especially the domestic consumer.—*Mechanical Engineering.*

Requirements of a Refractory Mortar

Specifications of a Refractory Mortar to be Used Within the Temperature Range of No. 1 Fire Brick

By Robert F. Lindsay
Denver Fire Clay Co., Denver, Colo.

ENGINEERS and users of refractories are recognizing the fact that failure of fire-brick settings are in many cases due to the use of milled fire clay as the bonding material. This failure is due to the shrinkage (probably averaging about 9 per cent) of the fire clay under heat which causes the mortar to become loose and fall from the joints both inside the furnace and at the rear of the settings. The result is that the setting becomes weak, the joints are rapidly eaten into by the flame and gases and proper control of combustion is impossible because of air leakage into or out of the furnace, depending upon pressure conditions, in either case resulting in losses of fuel and expensive repairs.

The apparent need of a refractory mortar that is more than a filler for laying fire clay refractories has resulted in the introduction of a number of so-called refractory cements of varying worth.

In the two years of study of refractory mortars under furnace conditions, during which time the Denver Fire Clay Co. perfected Hi-fire bond, that company found that there were certain requirements necessary to the production of a satisfactory bond. A discussion of these essential qualities will be of interest to every user of refractories.

Mortar Should be Really Refractory

The first specification of a refractory mortar to be used within the temperature range of a No. 1 fire brick is that it should be refractory, in other words, it should have a melting point close to that of the brick with which it is used. Fire clay mortar will stand this test, unless it has been mixed with materials such as the low fusing loams to reduce its shrinkage or cause it to fuse to the bricks in which case its value as a refractory mortar is lost. This same fault is found in many of the trade marked cements. To eliminate shrinkage and obtain a cold bonding strength, large quantities of foreign materials are sometimes added and as a result the most important requirement —refractoriness is sacrificed.

Hardening in the Cold

Hardening in the cold is of advantage only if sufficient time is available for slow drying, but it should be avoided unless it can be accomplished without eliminating some of the necessary qualities. Gross misstatements as to the melting points of some of the specially prepared refractory mortars have led to the distrust of many users of all refractory mortars. One refractory cement which was recommended by the manufacturers for use up to 3300 deg. Fahr. melted at 2300 deg. Fahr. during a test. Unless a mortar has the necessary high melting point the bond it produces is caused by a slag forming between the bricks. The result is that under a continued high heat the mortar will flow from the joints, scoring the wall and leaving the joints open to the action of the flames. Ashes and clinkers will readily cling to the slag, further reducing the resistance of the walls. Settling and distortion of the wall under continued heat will also result, and in arch construction or where there is a shearing action on the joint the brick will slip out of place. A mortar that is refractory and will sinter into a mass similar in properties to the brick itself is the desired one. It is not a strong hard joint in the cold that is wanted, but a hard refractory bond under heat.

A good milled fire clay, although of the same refractoriness as the fire brick, loses its value because of its high shrinkage. This causes the joints to become loose and all the ill effects of a loose setting will result. A satisfactory mortar should have a low shrinkage, so that it will stay put. Again this should not be accomplished by the formation of a slag, for refractoriness must be maintained.

The expansion and contraction of the mortar in relation to the fire brick is important. It should be equal to that of the fire brick or at least approximately so at varying temperatures; otherwise conditions nearly as bad as those obtained from using a mortar with a large shrinkage will occur. When silica is used as a base for the mortar, spalling and loose joints usually result because its expansion and contraction is not the same as that of fire clay bricks. One of the methods used to correct this fault (silica is used a great deal today because of its low cost) is to use basic fluxes, but here again the slag method of bonding is wrongly introduced.

Not only should the physical properties of the bonding material be like that of the brick, but the chemical properties should be similar, having the same resistance to the furnace gases, ashes, etc., with which the brick might come in contact. A mortar that, when exposed to fire, becomes a body similar in structure to the refractory bodies with which it is used and of similar chemical qualities, will best meet this requirement.

In attempting to reduce shrinkage and maintain refractoriness, difficulty was at first experienced in producing a mortar that possessed workability. A cement that is sandy in nature, but otherwise good, lacks plasticity, and with such a cement the desirable thin, well-filled joint cannot be made. Uneven laying and waste of material also results. The wet prepared cements can be easily used in making thin joints, and they usually harden in the cold, but this hardening takes place not only in the joint, but in the mortar box, on the workmen's hands and clothes and often in the containers, causing loss of material and dissatisfied workmen. Although a thin joint is recommended, it is at times necessary to use heavy layers of mortar and a wet prepared mortar if suited for making thin joints often cannot be used for the heavier joint unless some foreign material is used to thicken it. Good foreign material to add is not always available and if the wrong material is used another deleterious factor is introduced.

The requirements therefore of a refractory bonding material are summed up in seven essential qualities:

1. Refractoriness.
2. Low shrinkage.
3. Workability.
4. Same co-efficient of expansion and contraction as the brick.
5. Same chemical resistance.
6. High mechanical strength at high temperatures.
7. Reasonable cost.

Sand and Gravel Company Encounters Heavy Clay and Quits

DIRECTORS of the Lowell Sand and Gravel Co. of Lowell, Mich., recently filed in Circuit Court a petition for dissolution of the concern and the Grand Rapids Trust Co. was appointed temporary receiver. Hearing on a petition for the appointment to be made permanent will be held October 15.

It is explained in the petition that an unexpected encounter with heavy clay on the company's 331 acres along the Thornapple river has seriously affected its proposed business of the production and sale of sand and washed gravel and that the company's assets have been so far reduced by losses it will be unable to meet all just demands or to afford reasonable security to those with whom it deals.—*Grand Rapids Herald.*

Good Roads Show in Chicago January 14 to 18

THE annual convention of the American Road Builders' Association will be held at the Coliseum and Greer building in Chicago January 14 to 18, inclusive. Charles M. Upham, Raleigh, N. C., is convention manager.

Big Blast at Pounding Mill, Va.

Unusual Series of Pictures Showing Progress of a Big Shot Which Was Especially Loaded to Secure Much Fragmentation

ALL the illustrations on this page are photographs showing the progress of a blast recently made at the quarry of W. W. Boxley & Co., located at Pounding Mill in the southwestern part of Virginia. The shot was under the direction of S. R. Russell of the duPont company, and the results obtained are of considerable interest because of the fact that it was planned to get as good fragmentation as possible, which was necessary, due to the rather small type of crusher in use at this quarry. The shot was highly successful from all angles; a large quantity of stone being shaken down, the fragmentation being very good, and the stone being so well scattered as to make easy work for the shovels. The result of the shot was also satisfactory in that it reduced the amount of secondary shooting necessary, to a minimum.

Fig. 1—First appearance of smoke no sign of shattering

The material to be shot was hard limestone used mainly for railroad ballast and road material. In order to achieve the results sought for, the holes were spaced 15 ft. apart with an average burden of 30 ft. and varying in depth from 70 ft. to 150 ft. Seventy-five per cent duPont gelatin was loaded in the bottom and 60 and 50 per cent gelatin on top. Cordeau was used in all holes. In all, about 44,000 lb. of gelatin were used, producing in the neighborhood of 150,000 tons. The tonnage per pound is not exceptional, but the shot was loaded heavily in order to produce the maximum fragmentation consistent with the equipment for handling.

The illustrations for this were taken with a slow-motion moving picture camera.

While pictures of big blasts are not unusual, it is rarely that one sees a picture which shows us clearly just how the explosive does its work.

Fig. 4—Loose rock flying and bottom moving away from the face, as shown by comparing with Fig. 1

Losses in Compressed Air Lines

AT a pressure of 70 lb. per square inch, as much as 20 cu. ft. of air per minute will escape through a ⅛-in. hole, so there is little wonder that several small continuous leaks will render a compressed-air installation a luxury only to be tolerated when absolutely essential. Meters intelligently used will prove a good investment.

Fig. 2—Note how the rock begins to open on the bedding planes

Often on examining the pipe lines it will be found, especially on connection of hoses, that the mere tightening of a screw or union will save a tremendous number of cubic feet per day. Escapes of this kind are a constant loss and in the absence of a meter will probably go on undetected for an indefinite period, causing a continual loss of hard cash to the owners of the plant and generally serving to bring compressed air systems into disrepute, whereas, although this form of power transmission is not ideal from many points of view, it is so extremely useful and convenient and safe that the fullest and best use of it should be made in modern mechanical industries.—*Engineering and Mining Journal-Press.*

Fig. 3—The rock cracks and smoke issues from face

"No Accident" Month at the Lehigh's Sixteen Plants

JUNE was "no accident" month at the 16 plants of the Lehigh Portland Cement Co., and word comes from the central offices at Allentown, Pa., that up to this date there have been but three accidents with an aggregate of 25 days' lost time.

As the plants employ an aggregate of 350 men each, this is a remarkable record. So far as the Iola plant is concerned it stands right up at the head of the list with not a single lost time accident this year, which is a most remarkable record.—*Iola (Kans.) Register.*

Fig. 5—After the shot. Very complete fragmentation resulted from the method of loading

Hints and Helps for Superintendents

General view of storage pile and hoist, Western Lime and Stone Co.

Handling Crushed Stone In and Out of Storage

Western Lime and Cement Co. Has Installed a Simple and Effective System at Its Wisconsin Plant

A PROBLEM that often confronts the crushed stone and sand and gravel producer is the handling of a comparatively small quantity of material into and out of a storage pile. Where the stock to be carried runs into the thousands of tons it will pay to install one of the many elaborate and well-designed storage systems which have been worked out by competent engineers. These are very efficient and have a low operating cost so that their installation pays on a sufficient scale, but the installation cost is too high for storage piles of small and moderate tonnage.

The illustrations on this page show how the problem has been solved by the Western Lime and Cement Co. at their Wisconsin plant. A Sauermann dragline scraper bucket was installed and is used to drag the material into the pile and out of the pile to the loading hopper.

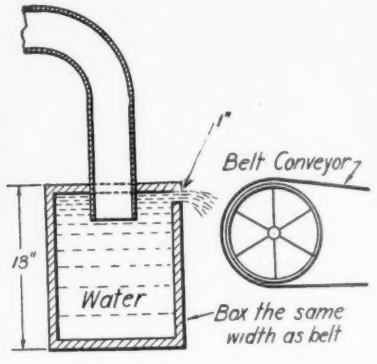
The crescent shape of scraper bucket is used

The scraper used is of the Crescent type, especially adapted to this work. It drags the stone which falls to the ground from the plant up an incline to a hopper from which it may be loaded into cards. When necessary it can be used to move part of the pile to another situation.

The illustrations show the operation too clearly to require more detailed explanation.

A Flat Water Stream

IN order to deliver a flat stream of water along the whole surface of a conveyor belt to give the material a second washing or rinsing and to accelerate its progress through the storage bins, the Ward Sand and Gravel Co., Oxford, Mich., worked out the device illustrated.



Box to make a flat stream

It consists of a wooden box, the width of the belt and about 18 in. deep. A 1-in. slit runs along the top of one side. The water pipe is inserted through the top, tightly fitted, delivers water into the box which finds its way out of the slit in a thin flat stream that washes the material off the belt cleanly and with no splashing.

The distance the box should be situated from the belt can be found with very little experimenting. The device is said to be more efficient as a washer than the usual sprays.

Left, shows the pile partly drawn down and the loading bin and mast in the background. Right, a close-up, showing details

How the bonnet on a dredge suction is protected from excessive wear

Protecting a Suction Bonnet with Rope Winding

OPERATORS of sand dredges know that the suction bonnet wears rapidly. A simple way to reduce this wear is to wind rope around it, as shown in the accompanying cut.

George Cook, engineer of the Stewart Sand Co., of Kansas City, who appears in the picture, is a firm believer in protecting parts exposed to wear in this way. The rubber sleeves, by which the lengths of pipe that make up the pontoon are held together, are protected by rope wrappings wherever they are exposed to any wear.

Since this method of protecting wearing parts has been adopted, a considerable saving has resulted. The saving is not so much in the value of the parts themselves as it is in the time which was formerly taken in replacing worn and broken parts.

Explosive Possibilities of Powdered Coal

POWDERED coal in bulk is not especially explosive, but when raised in a cloud it is as dangerous as a nozzle discharging gas into the open air. One form of coal dust which is exceedingly dangerous and to which perhaps too little attention is paid is that coming from small heating furnaces in which pulverized coal is used as a fuel. These furnaces are comparatively small and are used principally to heat bars and rods for forgings.

The pulverized coal is shot under pressure, and some of it is apt to get out into the surrounding atmosphere as flowing dust and finally settle all around the place.

A rather peculiar accident happened some time ago from dust of this kind in one of the Pittsburgh steel mills. At one point in the building an electric switch was so situated that dust could settle between the poles. One Sunday, when the mill was shut down, sufficient dust accumulated to form a short circuit, and as a result a whole panel of the switchboard in the power house was burned out. Many accidents have occurred practically all of which were due to the dusty and unclean condition of the buildings. Some risks, however, are more or less connected with the apparatus used in pulverizing the coal and delivering it to the point of consumption.—*Chemical Age.*

A Gas Heated Device for Drying Sand

IN the sand blast it is very important that the sand be perfectly dry so that it will flow without clogging. A device for drying sand, originally designed for another purpose, is in use in England, and is described in the *Foundry Trade Journal*—the official organ of the Institution of British Foundrymen.

The apparatus is based upon the familiar fact that wet sand is cohesive and clingy, and that when perfectly dry is runs almost without friction. It consists of a sheet-iron tank, the cross section of the bottom of which roughly resembles the letter W. At the base of the two Vs, which go to make the W, a ¼-in. slot is left open, and between the Vs runs a small gas pipe with several burner holes. The two Vs and the tank above them are filled with wet sand and the burner is lighted. As the sand near the burner is dried the surface tension in the wet sand is destroyed, and it drops in a dry state down through the slots to a receptacle below.

Oil for Chain Drives

ON chain driving mechanism a heavy bodied lubricant will be found to give best results. To use a cylinder oil or red or black oils on chains and gears simply to avoid stocking a proper lubricant for this purpose is poor policy and an unnecessary expense. Such oils are so light as to run off rapidly; they will not adequately protect wearing surfaces against weather, fumes, or dampness, etc.; they will add to the fire hazard due to their dripping and will entail more labor for application, attention and cleaning up.

There are numerous excellent chain and gear compounds on the market having a viscosity around 1000 seconds Saybolt at 210 deg. Fahr., prepared specially for this purpose and containing no detrimental compounds which might be injurious for high-grade machinery parts. They will not run or drip under normal boiler room temperatures; they do away with frequent applications, protect surfaces admirably, stand relatively high heats without danger of decomposition and possess a low fire hazard.

Air line and cable protected by track

Protecting Air Line and Cable

THE picture shows the method of protecting the air line and power cable at the Lutz quarry, Oshkosh, Wis., which is described in another part of this issue. The power line and cable are simply run beside the track in such a way that they cannot be easily damaged by any of the ordinary quarry operations. The advantage is that it gives the necessary protection without putting the line and cable underground.

Care of Leather Belts

THE occasion of taking a belt off the pulley for shortening or for repairs, always present the opportunity of making a careful examination of it, more particularly to see that it is being properly lubricated. A good leather belt requires no dressing on its grain, or pulley side to make it adhere to the pulley, for the natural pulley grip of the leather makes an adhesion with the pulley that is quite sufficient to transmit its rated load, but the leather is composed of thousands of little fibres that are constantly working on each other, and which require lubrication in the same manner as other working parts. It is well to avoid the use of dressings which produce an artificial adhesion between the belt and the pulley, for most of them are injurious, and all of them unnecessary, a suitable lubrication of the fibres of the leather being all that is required.

Canadian News of Rock Products Industries

Increases in Production Have Been Shown in All Principal Lines

A. DUCHESNE, manufacturer of artificial stone, Montreal, has been registered.

Up to the end of August this year there were 80 large provincial highway projects, totaling 785 miles, under way. The total expenditure was $9,336,373. Ontario had 100 miles, Quebec 110 miles, Prince Edward Island 166 miles, Nova Scotia 278 miles, Saskatchewan 3 miles and British Columbia 130 miles.

Thermo-stone Quarries Ltd., Toronto, has been incorporated with a capital of $500,000.

Castona Stone and Marble Co., Montreal, has been incorporated.

The International Cut Stone Contractors and Quarymen's Association will meet in January in 1924.

The Toronto Cement Corporation is at work erecting a cement plant at Beachville, Ont., to have a daily capacity of 4500 bbl.

The Toronto Brick Co. Ltd. is rebuilding the sand-lime brick plant on Windermere avenue, Swansen, Ont., that was destroyed by fire on July 16. The new building is 180x90 ft. The company is spending $60,000 on the plant.

Operations in gypsum in 1922 were confined to those of the Ontario Gypsum Co. Ltd., Paris, Ont. Quarries and mills are located at Caledonia and Lythmore in Haldimond county. During the year, 106,824 tons were quarried and 64,109 tons were calcined. Products marketed were crushed gypsum 43,288 tons, ground 883 tons, calcined 11,661 tons, and calcined gypsum in various gypsum products 54,395 tons. The total 110,227 tons of all grades marketed shows an increase of 30 per cent over the 1921 production.

Cement plants were operated by the Canada Cement Co., Thurlow township, near Belleville, and at Port Colborne; also by the Hanover Cement and Stone Co. and by the St. Mary's Cement Co. Production exceeded that of 1921 but the value dropped. Prices ranged from $1.50 to $2.22 per barrel of 350 lb. Between 1916 and 1920 the average price rose by degrees from $1.05 to $2.15 per barrel f.o.b. works. Stock on hand on January 1, 1923, was 396,911 bbl. compared with 174,687 bbl. at the beginning of 1922.

The small lime kiln for burning quicklime for local use is rapidly disappearing and giving place to larger and up-to-date plants, several of which are now equipped for the production of hydrated lime. Chemical and sugar refineries use about 40 per cent of the total output of quicklime. Production for the year was 32,873 tons of hydrated lime, worth $419,183, and 83,896 tons of quicklime, valued at $896,296.

Production of sand-lime brick in 1922 showed a greater increase in production than brick made from clay. The average price obtained was $15.76 for sand-lime brick.

Sand and gravel showed a greatly increased output. Sand output is divided into glass, 1838 tons, molding 147,236, and building 756,318 tons. Gravel for all purposes (railway ballast excepted) exceeded 1,500,000 cu. yd., of which 528,193 yd. was removed from the beds of the lakes and rivers by dredges and sand suckers under license from the Ontario government. Several of tese are operating on the Great Lakes.

The Ontario Department of Highways used in road construction over one-third of the entire output of crushed limestone in 1922. Limestone, produced for all purposes, was 1,693,387 tons, worth $2,032,133. Classified according to use, limestone marketed was divided as follows: building, 16,823 tons; chemical and fluxing, 83,751 tons; rubble and rip rap, 91,259 tons; crushed stone for concrete and roads, 1,501,554 tons. Granite production sales amounted to more than $17,789 and trap rock sales of 156,654 tons were valued at $155,103. Bancroft Marbles Ltd. did not operate in 1922 but with increased capital and with the electric power which is now available they have been able to operate in 1923.

Gypsum Production of Canada*

THE Dominion Bureau of Statistics issues the following finally revised statistics on the production of gypsum in Canada during 1922:

The total output of gypsum rock in Canada during 1922 amounted to 484,629 tons, of which quantity 145,954 tons, or 30 per cent, was calcined. The quantity quarried, by provinces, was: Nova Scotia, 281,861 tons; New Brunswick, 56,692 tons; Ontario, 106,829 tons; Manitoba, 39,147 tons, and British Columbia 100 tons.

For statistical purposes the production of gypsum is considered to be the sum of the quantities disposed of in the different marketable forms, care being taken to avoid duplication; the values used are those at point of shipment.

Shipments of all grades totaled 559,265 tons, valued at $2,160,898, an increase of 172,715 tons and $375,360 over the 1921 production. The 1922 production included lump or mine run, crushed, fine ground and calcined gypsum sold; calcined gypsum used in the calcining plants for the production of wall plaster, alabastine and other gypsum products was also included. The average value per ton received by operators throughout Canada was, by grades: lump, $1.52; crushed, $2.26; fine ground, $6.22, and calcined, $10.67. Prices during the previous year averaged as follows: lump, $1.78; crushed, $2.56; fine ground, $3.42, and calcined, $10.61.

SHIPMENTS OF GYPSUM BY GRADES IN CANADA, 1922

	Tons	Value
Crude:		
Lump or mine run	350,650	$ 534,160
Crushed	68,181	154,197
Fine ground	5,769	35,880
Calcined:		
Calcined gypsum sold	25,339	309,879
Calcined gypsum used in the manufacture of gypsum products, such wall plaster, alabastine, etc. (Weight and value of gypsum content only)	109,326	1,126,782
Total sold or used	559,265	$2,160,898

SHIPMENTS OF GYPSUM, BY PROVINCES, IN 1922

	Tons	Value
Nova Scotia	332,404	$ 580,148
New Brunswick	82,462	517,668
Ontario	110,227	621,668
Manitoba	34,072	440,914
British Columbia	100	500
Total for Canada	559,265	$2,160,898

*From La Presse Promotion Department, Montreal, August 21, 1923.

Nova Scotian Gypsum Mine, Reopened, Employs 800 Men

AFTER a lapse of eight years, gypsum mining at Eastern Harbor, Cape Breton, on the property formerly owned by the Great Northern Mining Co., has been resumed by the International Gypsum Corporation. The company employs 800 men in mining and auxiliary operations when producing gypsum at average normal capacity. The first cargo will go directly to Boston, whence the raw material will be distributed to various manufacturing plants.

A Correction

IN a recent issue there appeared an advertisement by the Celite Products Co. on Sil-O-Cel Heat Insulation in which the statement was made that Sil-O-Cel Insulating Brick possessed a crushing strength of more than 400 lb. per square foot. Sil-O-Cel Insulating Brick possess a much greater crushing strength and the statement should have read "400 lb. per square *inch*," the equivalent of about 28 tons per square foot.

THE PRODUCTION OF ROCK PRODUCTS IN THE PROVINCE OF ONTARIO IN 1922

	1921		1922	
	Quantity	Value	Quantity	Value
Feldspar, tons	15,506	$ 114,059	15,515	$ 94,985
Gypsum, crude and refined	365	23,273	626	34,124
Gypsum, crushed, ground and calcined	84,765	433,053	110,227	621,668
Quartz and silica brick	12,957	74,635	81,168	149,302
Cement, portland, bbl.	2,723,072	6,425,266	3,104,386	6,235,370
Lime, tons	91,355	1,172,680	116,769	1,315,479
Sand and gravel, cu. yd.	1,412,956	668,098	2,132,875	963,922
Sand-lime brick, M	.....	456,700	48,924	770,597
Stone, building, trap, granite	.....	1,812,863	.....	2,205,025

Editorial Comment

Labor in Quarries

In the past year or so, quarries, as well as many other industries, have felt the need of more common labor, and while we have not heard of any operation that had to shut down on account of a labor shortage, it is known that production in some cases was decreased on this account. Most quarry men have met the problem in the logical way, by better organization and management to make the available labor as efficient as possible, and by installing labor-saving machinery where it could show a profit. In this way the tonnage produced per man has risen steadily, and in spite of the higher wages paid and the (sometimes) scarcity of labor, the price of crushed stone has not risen very seriously, as a comparison of the prices quoted in Rock Products will show.

A Notable Illustration

In the present issue is described a notable illustration of the ability of good management and organization in keeping down labor costs. The Lutz company is producing an average of 600 tons of rock per day with eight men. Excluding the men employed in drilling (which is done by contract), this figures out to 75 tons per man, which is a somewhat remarkable record. Of course there are peculiar local conditions that make quarrying easier than in some other places, but after discounting all this, what remains is still a notable achievement in quarry operation.

Good Effects of High Wages

A constantly rising wage scale is a source of worry to any manager, and especially to the producer of raw materials whose eye must be kept forever on the cost sheet. But it is not an unmixed evil. It stimulates management and the use of labor-saving machinery, and more than one operator has found that the labor-saving improvements he made so reluctantly have not only solved his labor problem but lowered his costs and increased his profits almost against his will. Good organization is equally helpful. One recalls a manager whose theory was that no plant was working to the limit of its production and that there was always an added five or ten per cent to be had, if the men understood it was required of them. He proved his theory in more than one big plant. The reason why the alert and energetic student of men and machines has come to the front so fast in the last generation, is that he understands and appreciates these things. He is not satisfied to "guess that it will pay" when he puts on a new man or installs a new machine. He works from definite figures.

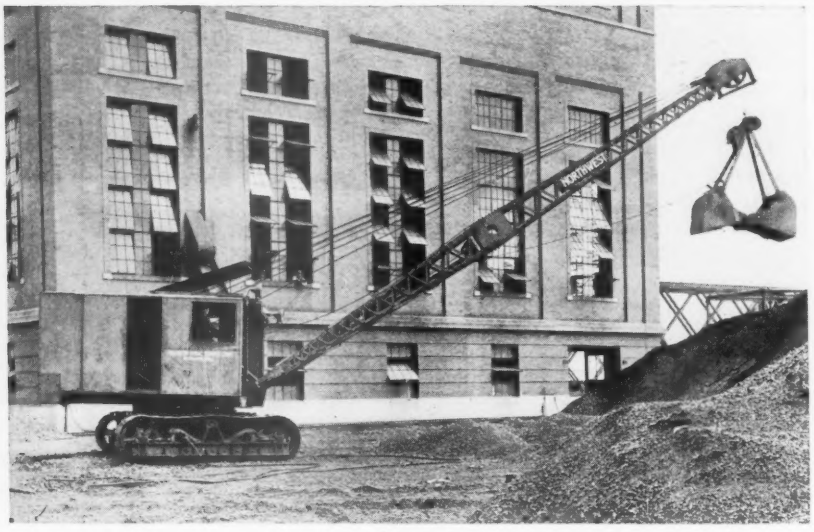
Engineers and Labor

Engineers are well advised as to the capabilities and limitations of machines of iron and steel, but their knowledge of the human machine is still deficient. No one could believe that the same men working five shifts a week could make a plant produce three-fourths as much as is produced in twelve shifts, but this is done in the Joplin zinc mills, according to a statement of the *Engineering and Mining Journal Press* published elsewhere in this issue. And these plants are supposed to be automatic and the men to be merely "machine minders!" As a matter of fact, they are as efficient and automatic as the men who look after them make them by keeping them up to their work and seeing that they are always in good condition.

Buying Big Enough

A manufacturer of clutches told Rock Products the other day that his hardest job was to get users of clutches to buy them big enough, and said that this was especially true of his customers in the rock products industries. The customer could not understand why a clutch that would transmit 100 hp. should not do for a machine that took 100 hp. to run. The customer forgot that the starting torque on some machines might be three times the power required for driving it after it was in motion, and he also forgot the unusual strains to which such a machine as a rock crusher might be subjected. There are other machines for which no additional force is required in starting so it would not do to underrate the clutch to meet the abnormal condition. This particular case is chosen because it illustrates a principle. Every man who has sold machines has run up against the customer who asked for a guarantee that the machine would "stand up" under any sort of treatment he wanted to give it, and who was hard to convince that it would be real economy to buy a larger and stronger machine than that rated for his required capacity. Fortunately, that sort of customer is growing less in number, although he still exists. One may believe that he is a holdover from a generation ago, when capital was scarce and hard to get and when a man had to spread his money thin to get it to cover the cost of a new installation. Those were the days of flimsy plant structures and lightweight machines that could not hold their own in foreign markets, in spite of their lesser cost. Fortunately that day is gone. A good illustration of the value of buying big enough is to be found in the article already referred to in which it is pointed out that one reason for the large output with a limited force is the size of the main crusher, so big as not to choke.

New Machinery and Equipment



Northwest crawler crane handling coal at an industrial plant

Your Coal Handling Problem—and the Crawler Crane

By C. R. Dodge
Northwest Engineering Company

WE know that a large percentage of power plant operation profits is eaten up by the costs of coal handling.

All power plants, either large or small, find it necessary to store coal within the plant in greater or lesser quantities in order to insure having fuel on hand at all times. In small plants the quantity stored would probably be sufficient to supply the plant for several months. In large plants where daily consumption is extremely large, outside storage space must be maintained.

In both cases the coal must often be handled several times before it is consumed—and the ashes removed.

This gives rise to the question, which of the many methods, now more or less successfully used, is the most economical and the least likely to cause trouble?

Many large concerns have worked out their own schemes for the solution of the problem, others have spent huge sums of money for overhead rigs, long belt systems good for only the one operation of carrying coal to the bunkers, screw conveyors, high priced locomotive cranes and gantry cranes, overlooking entirely the fact that there is such a thing as a crawler type gas or electric crane with a ¾-yd. or 1-yd. clamshell bucket.

The problem is the unloading of cars to the storage pile, transferring the fuel from storage pile to the bunkers and then removing the ashes from the pits back to the cars, and this the crawler crane will do, efficiently and quickly.

Let us make some comparisons. The gasoline or electric crawler type crane brings with it a freedom from the evils of steam, as compared with the locomotive crane. The fire hazard is eliminated. Trouble with boiler tubes, the result of bad water and scale and the danger of freezing in winter, is entirely done away with. There is no smoke or dirt, no ashes to rake out or fires to draw, no time lost on stoking, or taking water, no need for a watchman and, because of its simplicity, the element of human carelessness need not be considered—thus upkeep is greatly simplified and upkeep costs reduced.

This is particularly so with the electric type machine. Here there is room for vast possibilities toward economy and large production.

Where the low cost of electric power, and an easy power tap is possible, as it generally is around the industrial or power plant, the electric machine fits in admirably. It is just another application of the ever-ready power that is applied to the equipment of any factory. It is ready to run with a pull of the switch. It needs no attention through the day and consequently puts in a full day's work.

Overhead trolleys, gantry cranes, stationary cranes and locomotive cranes are highly expensive and they lack the mobility that the crawler type machine supplies.

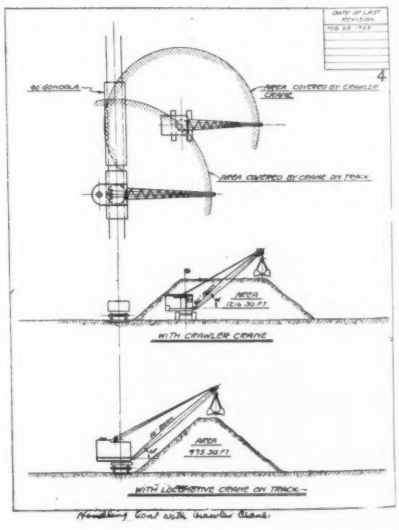
Take, for instance, the locomotive crane, or any of the other types mentioned above. They must be of great size or they are confined to a limited area, that space within reach of the boom from the rails on which they run. The locomotive crane must unload coal cars from the end or from a track parallel to the cars being unloaded. If the former, the car must be switched out of the way as soon as it is emptied, necessitating extra work and a loss of time; if the latter, one track must be kept open for the operation and movement of the crane. Similar troubles are encountered in the use of aerial rigs and trolleys.

On the other hand, the crawler type machine goes anywhere, climbs piles, unloads from any position, handles all kinds of materials and switches cars with ease.

Note the diagram on page 14. Here the efficiency of the crawler machine can be understood at a glance. The area covered by the crawler type machine with 40-ft. boom in unloading cars is vastly greater than the locomotive type even when equipped with a 50-ft. boom, the former unloading to an area of 1216 sq. ft., the latter to only 975 sq. ft.

Similarly the same consideration enters into the transferring of fuel from storage piles to bunkers.

Overhead coal handling systems are large, cumbersome, involve a great initial cost, must cover great areas for efficient work, consume too much power in comparison with the work they do and, like most great appliances, have too much about them to get out of order. They are, to be sure, handled by one man and always ready to run—but so is the gas or electric crawler crane



Comparison of crawler and locomotive crane loading areas

and the consumption of power is far lower, thus insuring greater economy.

Again the mobility of the crawler type machine becomes of value.

Answering the ash handling problem is often a plant's greatest bugbear. In this case, when the crane is not at work on the coal pile, it can be quickly moved and placed to handle ashes directly from pit to cars.

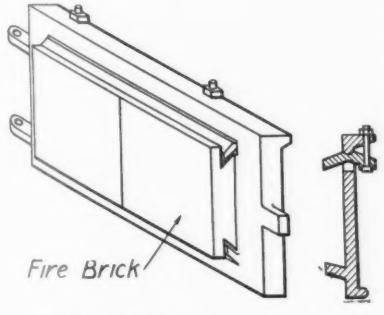
And there are many other uses to which such a machine may be put. By the substitution of a hook block for the bucket, converting it to a standard crane, the moving of heavy materials or equipment is possible, making it more than a mere handler of coal.

New Way of Recording Carbon Dioxide in Flue Gases

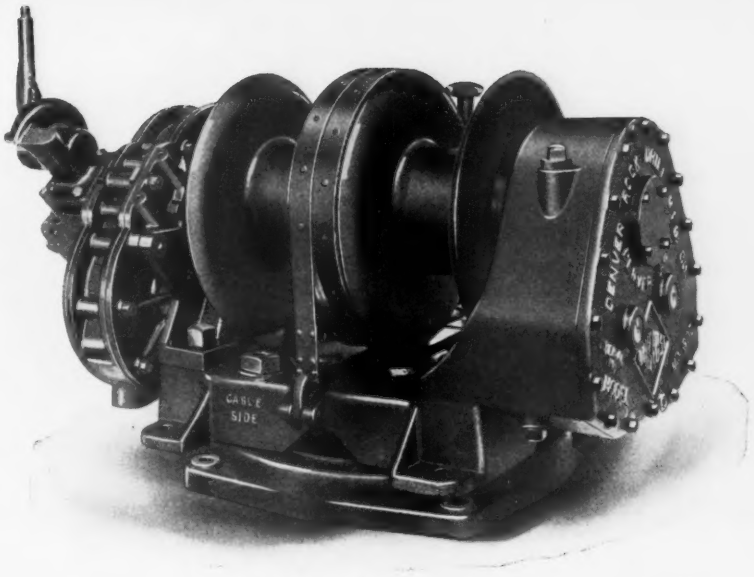
THE Brown Instrument Co., of Philadelphia, has developed a new CO_2 recorder. It measures the percentage of CO_2 present by the difference in the thermal conductivity of the gas, instead of by chemical analysis. The principle is not particularly new and instruments of this type have been made in Europe, but this is the first American machine to be placed on the market. The advantages of the method employed are that it can record at any distance from the boiler and the record is continuous. The attention required is reduced to a minimum.

New Lime Kiln Door

N. C. TAYLOR, of the Staunton Lime Products Co., of Staunton, Va., has designed a kiln door which is shown in the above sketch. He writes that before these were installed there was considerable trouble with kiln doors which has now been obviated. The doors were made of cast iron with two stationary beveled ridges which hold the fire brick in place, the brick being driven in between the ridges, and the trouble come from bricks falling out. With the present door, the bricks are shoved in above the stationary rest and are held firmly in place by tightening the bolts which clamp the floating clamp tightly against the edge of the brick. Mr. Taylor has applied for a patent on this door.



Bricks will not fall out of this kiln door



Model 300 Turbo Waughoist

Model 300 Turbo Waughoist

THE Denver Rock Drill Mfg. Co., of Denver, Colo., has brought out its Model 300 Turbro Waughoist, which is operated by compressed air. Its advantage is that it is small and compact and can be easily moved to any part of the operation where a small power hoist is needed. It will develop 10 hp. with 50 lb. air pressure at the hoist, which is the pressure recommended by the makers.

Primarily this machine was devised to operate a small scraper and used in this way it will give a rope speed of 400 ft. per minute with a light load (as on the bucket return), 235 ft. per minute when the rope pull is 1800 lb., and 118 ft. with 2200 lb. pull.

A ¾-in. air inlet is used when operating at recommended speeds and power, but a 1¼-in. air opening may be used when operating at low pressures or to increase the power developed to the maximum.

The engine is a simple rotary engine or "air turbine" consisting of two toothed rotors in a case. There is no dead center and all vibration is eliminated. The air consumption per horsepower is said to be lower than in other types of similar machines. A compact reduction gear in a casing reduces the engine speed to that desired for the hoist drum. The brake is of a simple type that has been proven efficient through years of experience with hoists.

This little hoist would have a number of uses in the rock products industries where small scrapers are used to clean up around stick piles over a conveyor and in gypsum mines, etc. It weighs 495 lb. and the turntable which accompanies it weighs 92 lb. The drum will hold 775 ft. of ¼-in. rope or 346 ft. of ⅜-in. rope.

Winter Storage vs. Summer Shutdown

LAST spring, before the weather permitted a square yard of concrete pavement to be laid, Illinois road contractors had more than *a million and a half* cubic yards of *tested and accepted* materials—sand and stone—in stock piles. Over a *million* barrels of portland cement were piled in warehouses on the job, ready for use whenever the weather permitted the pavers to start mixing concrete. These materials were obtained and stored as a part of the contractors' agreements with the state which included liberal partial payments for material in storage. Thus the contractor's tied-up capital was reduced to a minimum.

In Illinois, the result in concrete road completed during 1923 will be about 1000 miles added to the state's system. There have been practically no delays in concreting operations due to lack of material. The quality of the material in storage is assured by tests at the sources of supply before shipments are made.

This highly desirable condition of preparedness is made possible only because of the Illinois policy of awarding contracts in the late summer and fall for the following season's construction. Storage of material is required on practically all road contracts, regardless of the time of year awarded. It is usually stipulated that at least one-third of the total material needed for the improvement shall be delivered before construction commences. A proportionate supply must be kept on hand as the work progresses, until all material has been delivered.

This method helps to reduce the summer "peak" on material producing plants and transportation facilities. It helps to eliminate delays due to lack of material during construction.—*Concrete Highway Magazine.*

Bartow, Fla., to Stop Phosphate Mining Close to City

BARTOW, Fla., Sept. 22.—A movement has been set on foot to extend the city limits of Bartow northward to the point where the Lakeland road takes a turn to the west, about one-third of a mile beyond the present northern limits of the city, and to the eastward of the present eastern limits for at least a half mile.

The prime object of the proposed extension of the city limits in the directions indicated is to preclude the possibility of having the land, which is owned by phosphate companies, mined and converted into great wastes of pits and spoil banks to the great detriment of the city.

It is held by those who have made a study of the real estate situation; that the land involved is worth much more as high-class residence property than it is as phosphate land and they hold the phosphate companies will gain rather than lose if the city takes it into the corporate limits.

Virginia-Carolina Company Sells Holdings in American Cyanamid Co.

THE Virginia-Carolina Chemical Co. has sold its common and preferred holdings of American Cyanamid Co. for a sum said to be between $1,500,000 and $2,000,000. It is understood that Benjamin N. Duke was the buyer.

The Virginia-Carolina Chemical Co. realized a large profit from the sale, which included approximately 15,000 shares of American Cyanamid common and several thousand shares of the preferred.—*Chem. and Met. Engineering.*

$65,000 Bid for Tennessee Phosphate Plant

E. T. SHULER and H. Allison Webster, of Columbia, Tenn., who on Wednesday bid $50,000 for the property of the Peerless Chemical Co., which was sold at auction in the chancery court, later advanced their bid to $65,000. It stands there, although the impression prevails that it will not be confirmed by Chancellor Thomas Lytle at that figure. The property is known to represent an investment several times this sum and the debts, expenses, costs and fees will far exceed it.

No date has been set for a hearing of the report of the clerk and master on the sale.

Reduced Rates on Iowa Crushed Stone

SWEEPING reductions in the freight rate on crushed stone shipped from the Linwood and Buffalo quarries to points in Illinois, have been tentatively ordered by the Interstate Commerce Commission, constituting a complete victory for the traffic bureau of the Davenport (Iowa) Chamber of Commerce, which fought the case before the commission in behalf of its clients, the Linwood Stone and Cement Co.

With two slight exceptions, the I. C. C. has granted every demand of the traffic bureau in behalf of its clients. The exceptions were the rate from the Buffalo and Linwood plants to Springfield and Bloomington, which were fixed at 10c. higher than the traffic bureau asked.

While the new reduced rates will in all probability not be put into effect until next spring, the Linwood and Buffalo plants can submit bids on stone for Illinois paving projects, on the basis of the coming reduction.—*Davenport, Iowa, Times.*

Hold Cement Rate Hearing

LEO FLYNN, examiner for the interstate commerce commission, sat with the Kansas public utilities commission in a joint hearing on several cement rate cases brought concerning rates in Kansas and Missouri. At this joint sitting of the two commissions seven different cement rate cases are being considered—three interstate and four intrastate.

The cases affect cement rates from Bonner Springs and the Kansas Gas Belt and Sugar Creek, Mo., and St. Louis to points in Missouri, Kansas, Iowa and Nebraska. Missouri cement producers brought three of the cases in the interstate commerce commission, alleging discrimination.— *Topeka, Kas., Capital.*

Arizona Gypsum Deposits

SAMPLES of gypsum of remarkable quality have been brought to Phoenix, Ariz. from near Winkelman, where there is a deposit said to be of at least a half billion tons. Much of it is considered true alabaster, destitute of foreign matter and especially well suited to the making of plaster for building purposes. It is believed a large field for its use exists in southern Arizona, as a fertilizer and antidote for soil alkalinity.

Large beds of clear, stratified gypsum are to be found in the valley of Tonto creek, at the upper end of Roosevelt lake, and a large basin filled with the material lies near Anita Station on the Grand Canyon Railway, apparently formed there by an overflow of sulphurous copper-bearing solutions working through the limestone that caps the region. Commercial plaster is being produced at Douglas.

Missouri Valley Sand and Gravel Producers to Meet December 17 and 18

AT an executive committee meeting of the Missouri Valley Association of Sand and Gravel Producers, held October 16, at Kansas City, it was decided to hold the annual meeting at the Muehlbach hotel in Kansas City on December 17 and 18.

Farmers Kick on Agstone Freight Rates

SOME farmers in Henderson county have been making complaint of the freight charges on limestone shipments with which they use to replenish and feed the soil.

Two specific instances are cited. One of them is that T. A. Porter, of Robards, bought 45 tons of limestone from the quarries at Cerulean, f. o. b. on cars at that point, for which he paid 25 cents a ton, amounting to $11.25. The freight from Cerulean to Henderson was 70 cents a ton, amounting to $51.50, and the freight on same from Henderson to Robards was 80 cents a ton, amounting to $36, or a total of $78.75, or about seven times as much as the limestone cost originally.

Jesse Farley and R. L. Jordan also had shipped to them at Basketts from Cerulean, 45 tons which cost $10.88, on which there was freight amounting to $60.03, thus totaling $70.91.

One farmer ventured the assertion that it would greatly benefit the railroads if they would haul this limestone for nothing to the farmers, as it would increase the tonnage of products.—*Henderson, Ky., Gleaner.*

Onyx Quarries at Mayer, Ariz. Opened

THE onyx quarries at Mayer, Ariz., once owned by "Buckey" O'Neill, again are being operated, by the Yavapai Onyx Mining Corporation, a company headed by Joseph A. Kelly of Dubuque, Iowa, and managed by W. O. Belford. Carload shipments of the stone are being made to Dubuque, where the company has a cutting, fashioning and polishing plant.

Several of the blocks shipped weigh a ton, taken from a new seam of exceptionally beautiful rock. At Mayer is to be established a crushing plant, to work up the trimmings and the poorer grade into a powder, from which a mosaic material will be made especially for floors.

Japanese Building Material Demand

AMERICAN building material manufacturers have an estimated reserve capacity worth approximately $426,865,000 for the Japanese reconstruction program before demand so far approaches supply as to greatly inflate domestic building costs.

Had there been no mid-year buyers' strike the margin for the Japan emergency would have been far less. The turn toward greater national building activity since July 1, however, is significant. August, for example shows a national 56.4 per cent gain over the same month in 1922. The national gain for July and August for the two years 1923 leads over 1922 by $44,000,000.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert,
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning October 15:

Central Freight Association

7178. Slag, furnace, also Ashes and Cinders (except mill cinders and pyrites ore cinder), Columbus and South Columbus, Ohio, to Kokomo and New Castle, Ind. Present, $2.65 and $2.27 per gross ton; proposed, $2.05 and $1.75 per net ton.

7214. Molding Sand, Delhi, Ohio, to Fostoria and Toledo, Ohio, Detroit, Mich. Present, $2.27 per net ton to Fostoria and Toledo and $2.65 per net ton to Detroit, Mich.; proposed, $2.02 per net ton.

7236. Sand (other than blast, engine, foundry, glass, molding or silica), Toledo to Petoskey, Mich. Present, Sixth Class; proposed, $2.54 per net ton. Minimum weight marked capacity of car; except when loaded to cubical or visible capacity, actual weight will apply.

7242. Gravel and Sand (other than blast, molding, engine, foundry, glass or silica), Ambridge, Pa., to Shippensville, Pa. Present, 21½ cents; proposed, $1.60 per net ton.

7280. Rough Stone, Chicago to Cleveand, Ohio. Present, $3.28 per net ton; proposed, $3.53 per net ton.

7281. Crushed Stone, Cold Springs and Durbin, Ohio, to Ohio. Present, Sixth Class; proposed, to Lagendan, Thorpe, Royal, South Charleston, South Solon, Blessings, Jeffersonville, Parrott, Heglers, Washington C. H., Fraser, Boyds, Good Hope, Ghormleys and Greenfield, 80 cents; Thrifton, Fruitdale, Humboldt and Bainbridge, 90 cents per net ton.

7292. Sand (except blast, engine, foundry, glass, loam, marl, molding and silica), Winona Lake, Ind., to Muncie, Ind. Present, 14½ cents; proposed, $1.13 per net ton.

7295. Crushed Stone, Sandusky, Ohio, to points in Ohio. (Rates in cents per net ton except as noted.) From Sandusky, Ohio:

To	Present	Proposed
N. Y. C. & St. L.		
Avery, Ohio	$1.00	$0.70
Lorain, Ohio	1.00	.80
Cleveland, Ohio	.18½*	.90
A. C. & Y. (N. O.)		
Akron, Ohio	.15*	.80
L. A. & S.		
Ashland, Ohio	.90	.80
Erie		
Wadsworth, Ohio	.15*	.80
W. & L. E.		
Lodi, Ohio	.13½*	.80

*Sixth Class rate, applicable per 100 lb. Rates from and to intermediate points adjusted as necessary to prevent Fourth Section departures.

Illinois Freight Association

1697A. Crushed Stone, C. L., minimum weight 90 per cent of marked capacity of car, 88 cents per net ton from McCook, Ill., to Goluca, Ill.

2044A. Lime. Proposed revision of rate of 10½ cents per 100 lb. Minimum weight 60,000 lb., from Mosher and Ste. Genevieve, Mo., to Decatur, Ill., and 11½ cents per 100 lb., same minimum weight, from original points named to Edwardsville, Ill., versus rate of 11 cents to Decatur, Ill., and 12 cents per 100 lb. from Hannibal, Mo., Marblehead and Quincy, Ill., minimum weight 30,000 lb.

2115. Sand, C. L., minimum weight 90 per cent of marked capacity of car, $1.40 per net ton from Muscatine, Iowa, to Milwaukee and Racine, Wis.

2118. Crushed Stone, C. L., minimum weight capacity of car, $1.30 per net ton from Kankakee and Lehigh, Ill., and $1.43 from Thornton, Ill., to Bartlett, Maxwell, Hanna, Eden, Cramer, Farmington, Middle Grove, Rapatee, Londay Mills, Hermon, etc.; $1.40 from Kankakee and Lehigh, and $1.52 from Thornton to Eleanor, Litte York, Seaton, Ogle and Keithsburg, Ill.

2122. Crushed Stone, C. L., minimum weight capacity of car, $1.20 per net ton from Rosiview and Shetlerville, Ill., to Mermet and Forman, Ill. (M. R. P. 253.)

2123. Stone, Sand and Gravel, $1.18 from Joliet, Ill., to Gillum, Downs, Le Roy, Farmer City, Mansfield, Rising and Champaign, Ill., on stone, sand and gravel, carloads, minimum weight 90 per cent of marked capacity of car, and $1.06 per net ton from Lincoln, Ill., to Leslie, Tremont, Menert, Mackinaw, Lilly, Woodruff and Danvers, Ill. on sand and gravel, C. L., same minimum weight.

2124. Limestone, ground (in bulk), crushed or rough quarried, C. L., minimum weight 90 per cent of marked capacity of car, 88 cents per net ton from Columbia Quarry No. 2 and Krause, Ill., to Chester and Menard, Ill. (M. R. P. 252.)

2138. Crushed Stone, C. L., minimum weight 90 per cent of marked capacity of car, $1.26 per net ton from Thornton, Ill., and $1.13 per net ton from Chasco, Ill., to Mason, Ill., via Mt. Vernon and Jefferson Southwestern R. R. (M. R. P. 256.)

New England Freight Association

5305. Rough Granite, South Royalton, Vt., to Northfield and Montpelier, Vt., 8 cents; Barre and Waterbury, Vt., 9 cents; St. Albans, 10 cents; White River Junction, 7 cents. Reason: Proposed rates same as for equal distances on the B. & M. R. R.

5349. Lime, Lime Ashes, Limestone, Cheshire, Dalton, Farnams, North Adams, Renfrew, Richmond, Zylonite, Mass., to Peabody, Mass., 16 cents. Reason: To establish relationship with other joint line rates within N. E. Also to reduce rates to Tewksbury Junction, Mass., to 16 cents on lime and lime ashes to avoid Fourth Section violations.

Southwestern Freight Bureau

9733. Cement, portland, hydraulic and paving. To amend S. W. L. Trf. 90D and Item 4886A, S. W. L. Trf. 8E, to provide the same rates on cement (portland, hydraulic and paving), C. L., minimum weight 50,000 lb., from Ft. Worth, Texas, to destinations as indexed in S. W. L. Trf. 90D; also Natchez, Miss., as are now published from Harrys and Eagle Ford, Texas. Remarks: There is at present a very reasonable rate published from Harrys and Eagle Ford and it is contended that an equitable adjustment would be to extend that rate to Ft. Worth.

9753. Sand, Gravel and Crushed Stone. To amend Southern Pacific Lines' Tariff 1518B, I. C. C. 4423, by extending application of mileage scale to Cline, Texas, on sand, gravel and crushed stone, C. L., minimum weight marked capacity of car, except when cars loaded to full visible space carrying capacity, in which case actual weight will govern, from Cline, Texas, to stations in Louisiana on M. L. & T. R. R., La. Western R. R., I. & V. R. R. and L. C. & N. R. R. Remarks: It is desired to extend the mileage scale as published in 1518B to include Cline, Texas, which will permit shippers at that point the same scale of rates as now published from other points.

9770. Cement. To establish on cement, C. L., to Nancy and Braggs, Ark. From Memphis, Tenn., rate of 9 cents per 100 lb.; from other points of origin named in S. W. L. Trf. 90D same rates as are published to Bridge Junction, Ark. Remarks: It is contended that on account of their general location these two points should be given the same rates as in effect to Harvard, Ark.

Amendment 1 to 9445 (Bulletin 205). Cement Plaster and articles taking same rates. To establish rate of 20½ cents per 100 lb. on cement plaster and articles taking same rates from Ideal, Okeene and Darrow, Okla., to points on the F. W. & D. C. R. R., Ft. Worth, Texas, to Wichita Falls, inclusive.

Texas-Louisiana Tariff Bureau

5615. Cement, C. L., rates on, from Houston and Manchester to Sabine and Sabine Pass, Texas. Proposition from carriers to establish rate of 10 cents per 100 lb. on cement, carloads, minimum weight 60,000 lb., from Houston and Manchester, Texas, to Sabine and Sabine Pass, Texas, and Atreco, Texas. Shippers state the rate to Sabine, Sabine Pass and Atreco, Texas, should be no higher than to other points named in Item 8722, Texas Lines' Tariff 2H.

Trunk Line Association

11683. Gravel and Sand, N. O. I. B. N., in Official Classification, other than blast, engine, foundry, glass, molding or silica, C. L., minimum weight 90 per cent of marked capacity of car; except when car is loaded to cubical or visible capacity, actual weight will apply. Kenvil, Succasunna and Wharton, N. J., to South Kearny, N. J., $1.50 per net ton.

11691. Lime, building, C. L. (b) Lime, agricultural, chemical, gas, glass and land, C. L., and ground limestone, C. L., minimum weight 30,000 lb., except on ground limestone, 50,000 lb. Bellefonte and Pleasant Gap, Pa., to Newberry, Pa., (a) 11 cents, (b) 10 cents per 100 lb.

11694. Lime, agricultural, C. L., minimum weight O. C. East Allentown, Pa., to Lynnport, Pa., 11½ cents per 100 lb.

11724. Cement, common, hydraulic and portland, C. L., minimum weight 50,000 lb., except when for carriers' convenience cars of less capacity are furnished, in which case minimum weight will be the marked capacity of the car furnished, but in no case less than 40,000 lb., from Security, Union Bridge, Md., and York, Pa., to Richlandtown Pullen, Pleasant Valley, Mass., Springtown, Witte, Durham, Red Bridge and Riegelsville, Pa., 16 cents per 100 lb.

Southern Freight Association

11180. General revision of lime rates between points in Southern territory. The present lime rates between points in Southern territory do not reflect a proper adjustment in and of themselves, or as between competing kilns, with the result that numerous complaints have been filed by shippers and receivers. In response to such complaints the carriers are submitting a general revision of the rates on this commodity. For more detailed information as to the present and proposed rates, bases, etc., this association will, upon request, be glad to furnish interested shippers with the statistical data in its possession. Subject was heard September 18, but, on account of inability of various shippers to appear at that time, it was decided to hold the matter open for an additional 30 days until October 16. Shippers are invited to express views in writing before that time or orally at the meeting on that date.

11328. Cement, C. L., from Kansas City, Mo., Independence, Kan., and points taking same rates, to N. C. & St. L. Ry., Nashville division stations, Hollow Rock, Tenn., to Hickman, Ky., inclusive. At present, combination rates apply. Proposed rate, 21½ cents per 100 lb., same as in effect from Memphis, Tenn.

11349. Stone, crushed, C. L., minimum weight 30 tons, from Ball Mountain, N. C., to Dubose, S. C. (S. A. L. Ry.). No commodity rate at present in effect. Proposed rate, $1.96 per net ton.

11404. Stone, broken, crushed, rubble and ballast, C. L., from Franklin, Tenn., to Nashville, Tenn. Present rate, 57 cents per net ton; proposed rate, 40 cents per net ton, made not higher than the rates at present in effect from and to equidistant points on the L. & N. R. R., subsequent uses of stone to be moved under the proposed rate considered.

11425. Sand, C. L., minimum weight 40,000 lb., from Petersburg, Va., to Stuart, Va. Present rate, $1.96 per net ton; proposed rate, $1.80 per net ton, same as rate in the reverse direction.

11431. Stone, crushed, C. L., minimum weight 90 per cent of marked capacity of car; except when cars are loaded to their visible capacity, actual weight shall govern, from Blenkenbakers, Ky., to Anchorage, Eastwood and Simpsonville, Ky. Present rates: To Anchorage, 80 cents; to other points, 90 cents per net ton; proposed rate, 70 cents per net ton. (To expire March 31, 1924.) Proposed rate is in line with rates from and to other points in the same general territory, distance considered.

11440. Sand, straight, C. L., or sand and gravel, mixed, in bulk, C. L., minimum weight marked capacity of car, from Howard, Ga., to Mobile, Ala. Present rate, $2.10 per net ton (Birmingham combination); proposed rate, $1.85 per net ton, based on mileage scale submitted by carriers to the Alabama and Georgia Public Service Commissions, less 10 per cent.

Western Trunk Line

521A. Cement, hydraulic, portland or natural, straight or mixed, C. L., from Portland and Concrete, Colo., to stations on C. M. & St. P. Ry., Rapid City line, Rapid City, S. D., to Oacoma, S. D. Present, combination of locals; proposed, rates ranging from 30 cents at Murphy and grading upward attaining a rate of 37 cents at Oacoma, minimum weight 50,000 lb., except when marked capacity or car used is less, the actual weight, but not less than 40,000 lb., will apply.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.40	1.40	1.30	1.10	.....
Buffalo, N. Y.	1.30 per net ton all sizes					
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.	1.50 per net ton all sizes					
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Prospect, N. Y.	.80	1.40	1.40	1.30	1.30	.....
Walford, Pa.	1.55	1.55	1.55	1.55	1.55	1.55
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.75	.....	1.75	1.35	.....	.....
Bloomville, Middlepoint, Dunkirk, Bellevue, Ohio	1.00	1.10	1.10	1.00	1.00	1.00
Cypress, Ill.	1.25	1.25	1.25	1.25	1.25	1.25
Chicago, Ill.	.80	1.40	1.10	1.10	1.10	1.10
Dundas, Ont.	.90	1.35	1.35	1.25	1.10	1.10
Greencastle, Ind.	1.25	1.15	1.05	.95	.95	.95
Krause, Columbia and **Valmeyer, Ill.**	1.20	1.20	1.35	1.35	1.20	1.20
Lannon, Wis.	.75	1.00	1.00	.90	.90	.90
Linwood, Iowa	.80	.....	1.35	1.15	1.25	1.25
Mitchell, Ind.	1.00	1.00	1.00	1.00	1.00	1.00
Montrose, Iowa	.....	1.50	1.60	1.55	1.45	1.40
St. Vincent de Paul, P. Q.	.85	1.20	1.10	1.00	.95	.95
Sheboygan, Wis.	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10
Southern Illinois	1.35	1.35	1.35	1.35	1.35	1.00
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.35	1.35	1.35	1.35
Stone City, Ia.	.75	.....	1.50†	1.40	1.30	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25‡	2.25‡	2.25‡	2.00	2.00
Waukesha, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
SOUTHERN:						
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15	.....
Bridgeport, Texas	1.10	1.40	1.35	1.35	1.25	1.25
Cartersville, Ga.	.....	1.50	1.50	1.00	1.00	1.00
Chickamauga, Tenn.	1.00@1.25	.85@1.25	.....	.85@1.00	.85@1.00	.....
El Paso, Texas	1.00	1.00	1.00	1.00	1.00	.....
Ft. Springs, W. Va.	.60	1.70	1.70	1.50	1.40	.....
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Graysville, Ga.	1.00@1.25	.85@1.25	.....	.85@1.00	.85@1.00	.....
Ladds, Ga.	.....	.....	1.40	1.40	1.40	.....
Morris Spur (near Ft. Worth), Tex.	1.10	1.35	1.30	1.25	1.25	1.20
WESTERN:						
Atchison, Kans.	.50	2.10	2.10	2.10	2.10	1.60‖@2.10
Blue Spr'gs and Wymore, Neb.	.20	1.45	1.40	1.35	1.25	1.20
Cape Girardeau, Mo.	1.35	.....	1.10	1.35	1.10	.....
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.50	1.35	1.15	1.00	.....
Dresser Jct., Wis.	1.00	2.25	.....	1.75	2.00	.....
Duluth, Minn.	1.00	2.25	2.00	1.50	1.40	.....
E. Summit, N. J.	1.80	2.30	1.90	1.60	1.40	.....
Eastern Massachusetts	.85	1.75	1.75	1.40	1.40	1.40
Eastern New York	.75	1.50	1.50	1.30	1.40	1.30
Eastern Pennsylvania	1.25	1.55	1.50	1.40	1.40	1.40
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.50@2.00	1.35@1.50	1.15@1.25	1.00@1.10	.....
Oakland, Calif.	1.75*	1.75*	1.75*	1.75*	1.75*	1.75*
Richmond, Calif.	.75*	.....	1.50*	1.50*	1.50*	.....
San Diego, Calif.	1.80	1.80	1.50@1.80	1.25@1.55	1.25@1.55	1.10@1.35
Spring Valley, Calif.	.70	1.55	1.50	1.40	1.35	1.35
Springfield, N. J.	1.80	2.30	1.90	1.60	1.40	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga.—Granite	1.47	2.07	2.07	1.97	1.97	.....
Buffalo, N. Y.—Granite	.90	.....	1.20	1.00	1.05	1.10
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.—Granite	.50	2.25	2.25	2.00	2.00	2.00
Eastern Penna.—Sandstone	.85	1.60	1.55	1.35	1.35	1.30
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75	1.75	1.75	1.25	1.25	.....
Los Angeles, Calif.	2.00	2.00	1.85	1.75	1.65	.....
Middlebrook, Mo.—Granite	3.00@4.50	.....	2.00@3.00	2.00@2.25	.....	1.50@2.20
Sioux Falls, S. D.—Granite	1.00	1.60	1.55	.....	1.50	.....

*Cubic yd. †1 in. and less; ‡prices include 90c freight; ‖rip rap, 1.60 per ton.

Agricultural Limestone

(Pulverized)

Chaumont, N. Y.—Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$—Thru 100 mesh; sacks, 4.00; bulk	4.50
Grove City, Pa.—Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$; 60% thru 100 mesh; 45% thru 200 mesh; 100% thru 20 mesh; sacks, 5.00	3.50
Hillsville, Pa.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, 5.00; bulk	3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
New Castle, Pa.—94% $CaCO_3$, 1.40% $MgCO_3$—75% thru 100 mesh, 94% thru 50 mesh; sacks, 5.00; bulk	3.50
Walford, Pa.—Analysis, 50% thru 100 mesh; 4.50 in paper; bulk	3.00
Watertown, N. Y.—Analysis, 96 to 99% $CaCO_3$; .02% $MgCO_3$; 90% thru 100 mesh; bulk, 3.00; sacks	4.50
West Stockbridge, Rockdale, Mass., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
Alton, Ill.—Analysis, 98% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 100 mesh	6.00
50% thru 4 mesh	4.00
Belleville, Ont.—Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk	2.50
Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$; 90% thru 100 mesh	5.00
90% thru 50 mesh	1.35
Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh	1.80@3.80
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 80-lb p. sacks 5.00; bulk	3.50
Piqua, Ohio—100% thru 10 mesh, 2.10; 50% thru 100 mesh, 2.25; 80% thru 100 mesh, 5.00; 100% thru 100 mesh; bags 7.00; bulk	5.50
Waukesha, Wis.—Analysis, neutralizing equivalent 107.38% $CaCO_3$; 99% thru 10 mesh, 55% thru 60 mesh; bulk	2.35
200-mesh bags ex., returnable	4.50
Hot Springs, N. C.—50% thru 100 mesh; sacks, 4.25; bulk	2.70
Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200 lb. burlap bag, 4.00; bulk	2.75
Mountville, Va.—Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—50% thru 100 mesh; 100% thru 20 mesh; sacks	5.00
Colton Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Lemon Cove, Calif.—Analysis, 94.8% $CaCO_3$, 0.42% $MgCO_3$; 60% thru 200 mesh; sacks, 5.25; bulk	4.50
Dundas, Ont.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$—35% thru 100 mesh; 50% thru 50 mesh; 100% thru 10 mesh; bagged, 4.75; bulk	3.00

Agricultural Limestone

(Crushed)

Bellevue, Ohio—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh	1.25
Bettendorf, Iowa, and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Buffalo, Iowa—90% thru 4 mesh	1.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 100% thru 10 mesh, 90% thru 50 mesh	1.50
Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$; 90% thru 4 mesh	.80
Columbia, Ill., near East St. Louis—½-in. down	1.25@1.80
Elmhurst, Ill.—Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$; 50% thru 50 mesh	1.25
Huntington and Bluffton, Ind.—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; about 20% thru 100 mesh	1.25

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Agricultural Limestone

(Continued from preceding page)

Greencastle, Indiana.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh 2.00
Kansas City, Mo.—50% thru 100 mesh 1.25
Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh 1.20
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00
Screenings (¼ in. to dust) 1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 83% thru 10 mesh; bulk 1.25
Milltown, Indiana.—Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 35% thru 50 mesh ..... 1.40@ 1.65
Mitchell, Ind.—Analysis, 97% $CaCO_3$, 1% $MgCO_3$; 50% thru 100 mesh, 90% thru 4 mesh 1.25
Montrose, Iowa.—90% thru 100 mesh .. 1.25
Narlo, Ohio.—Analysis, 56% $CaCO_3$ 43% $MgCO_3$; limestone screenings, 37% thru 100 mesh, 55% thru 50 mesh, 100% thru 4 mesh ..... 1.50@ 2.00
Ohio (different points), 20% thru 100 mesh, bulk ..... 1.25@ 1.50
Piqua, Ohio—100% thru 4 mesh 1.25
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@ 1.40
Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ¼-in. mesh 1.30
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75
Toledo, Ohio.—¼ in. to dust, 30% thru 100 mesh 1.50
Waukesha, Wis.—No. 1 kiln dried 2.00
No. 2 Natural 1.75
Alderson, W. Va. — Analysis, 90½ $CaCO_3$; 90% thru 50 mesh 1.75
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$; 90% thru 50 mesh 3.00
50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh 2.75
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh 1.50
Ladds, Ga. — Analysis, 56% $CaCO_3$, 42% $MgCO_3$—all passing 10 mesh .... 1.50@ 1.75
Garnett, Okla.—Analysis, 80% $CaCO_3$, 3% $MgCO_3$; 50% thru 50 mesh ..... .50
Kansas City, Mo., Corrigan Siding—50% thru 100 mesh; bulk 1.80
Tulsa, Okla.—90% thru 4 mesh ..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:

Berkeley Springs, W. Va. ..... 2.25@ 2.50
Cedarville and South Vineland, N. J.—Damp, 1.75; dry 2.25
Cheshire, Mass.—24 mesh, 5.00; 40 mesh, 6.00; 100 mesh 7.00
Columbus, Ohio ..... 1.50@ 1.75
Dunbar, Pa.—Damp 2.50
Falls Creek, Pa. 2.25
Hancock, Md.—Damp, 1.50; dry 2.00
Klondike and Pacific, Mo. ..... 2.00@ 2.50
Mapleton, Pa. ..... 2.25@ 2.50
Mapleton Depot, Pa. 2.50
Massillon, Ohio 3.00
Michigan City, Ind. ..... .50
Millville, N. J. 2.00
Mineral Ridge, Ohio ..... 2.50@ 3.00
Montoursville, Pa. 2.00
Oregon, Ill. 2.50
Ottawa, Ill. 1.50
Pittsburgh, Pa.—Dry, 4.00; damp 3.00
Ridgway, Pa. 2.50
Rockwood, Mich. ..... 2.50@ 2.75
Round Top, Md. 2.25
Sands, Pa. 2.50
San Francisco, Calif. ..... 3.00@ 3.50
St. Louis, Mo. ..... 2.50@ 3.00
St. Mary's, Pa. 2.25
Thayers, Pa. ..... 2.25@ 2.50
Utica, Ill. ..... 1.40@ 1.50
Zanesville, Ohio ..... 2.00@ 2.50

Foundry Sand:

Albany, N. Y.—Core ..... 1.25@ 2.00
Furnace lining, molding fine, molding coarse, brass molding 2.00
Sand blast ..... 2.50@ 4.50
Allentown, Pa.—Core and molding fine 1.75@ 2.00
Arenzville, Ill.—Molding fine ..... 1.50@ 1.75
Brass molding 1.75
Beach City, Ohio.—Core, washed and screened ..... 2.00@ 2.50
Furnace lining ..... 2.50@ 3.00
Molding fine and coarse ..... 2.25@ 2.50
Cheshire, Mass.—Furnace lining, molding fine and coarse 5.00
Sand blast ..... 5.00@ 8.00
Stone sawing 6.00
Cleveland, Ohio.—Molding coarse ..... 1.50@ 2.00
Brass molding ..... 1.50@ 2.00
Molding fine ..... 1.50@ 2.25
Core ..... 1.25@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge and So. Hts., Pa.	1.25	1.25	.85	.85	.85	.85
Attica, N. Y.	.75	.75	.75	.75	.75	.75
Buffalo, N. Y.	1.10	.95	.....	.....	.85	.....
Erie, Pa.	.....	.75	.90	.....	1.25	.....
Farmingdale, N. J.	.48	.48	.65	.....	1.10	.....
Leeds Junction, Me.	.....	.50	1.75	.....	1.35	1.25
Machias, N. Y.	.75	.75	.85	.85	.85	.85
Pittsburgh, Pa.	1.25	1.25	1.25	.85	.85	.85
Portland, Me.	.....	.50	1.75	.....	1.35	1.35
Washington, D. C.—Rewashed, river	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.	.....	.85	.....	.....	.....	.....
Anson, Wis.	.35@ .40	.35@ .40	.....	.....	.....	.80@ .85
Barton, Wis.	.....	.40@ .60	.....	.50@ .70	.50@ .70	.....
Beloit, Wis.	.....	.70	.....	.....	.80	.....
Chicago, Ill.	.....	1.75@2.23	1.75@2.43	.....	.....	.....
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75	.75@1.00	.75	.75@1.00	.75@1.00	.75
Covington, Ind.	.75	.60	.75	.75	.75	.75
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
			Unwashed ballast, .50 ton			
Attica, Ind.	.75	.60	.75	.75	.75	.75
Moronts, Ill.	.60@ .80	.60@ .80	.60@ .80	.60@ .80	.60@ .80	.60@ .80
Oregon, Ill.	.60@ .80	.60@ .80	.60@ .80	.60@ .80	.60@ .80	.60@ .80
Ottawa, Ill.	.60@ .80	.60@ .80	.60@ .80	.60@ .80	.60@ .80	.60@ .80
Yorkville, Ill.	.60@ .80	.60@ .80	.60@ .80	.60@ .80	.60@ .80	.60@ .80
Dresden, Ohio	.70	.60	.60	.....	.90	.....
Eau Claire, Wis.	.40@ .50	.40	.85@1.25	.....	.....	.85
Elkhart Lake, Wis.	.60	.60	.70	.70	.70	.70
Grand Rapids, Mich.	.....	.50	.....	.80	.....	.70
Hamilton, Ohio	.....	1.00	.....	.....	1.00	.....
Hawarden, Iowa	.60	.50	.....	.....	1.60	.....
Hersey, Mich.	.50	.....	.....	.....	.70	.....
Indianapolis, Ind.	.60	.60	.....	1.50	.75@1.00	.75@1.00
Janesville, Wis.	.....	.65@ .75	.....	.....	.65@ .75	.....
Mason City, Iowa	.70	.65	1.75	1.70	1.65	1.60
Mankato, Minn.	.40‡	.40	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35
Milwaukee, Wis.	1.11	1.11	1.36	1.36	1.36	1.36
Moline, Ill.	.60	.60	Concrete gravel, 40% G., 60% S., .90			
Palestine, Ill.	.75	.60	.75	.75	.75	.75
St. Louis, Mo., f.o.b. cars	1.20	1.45	1.65§	1.45	.....	1.45‖
St. Louis, Mo., deliv. on job	2.05	2.20	2.35	2.15	.....	2.10
Silverwood, Ind.	.75	.60	.75	.75	.75	.75
Summit Grove, Ind.	.75	.60	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	1.00	1.00	.75	.75
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Winona, Minn.	.40	.40	.50	.90@1.00	.90@1.00	.90@1.10
			(.05 ton discount 10 days)			
Zanesville, Ohio	.....	.60	.60	.90	.90	.....
SOUTHERN:						
Birmingham, Ala.	1.29	1.29	2.79	1.79	1.64	1.54
Charleston, W. Va.	all sand 1.40 f.o.b. cars		all gravel 1.50 f.o.b. cars			
Estill Springs, Tenn.	1.35	1.35	.....	1.00	.85	.65
Ft. Worth, Texas	1.50@2.00	1.50@2.00	1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Lake Weir, Fla.	.....	.50	.....	.....	.....	.....
Memphis, Tenn.	1.00	1.00	1.80	1.80	1.80	1.80
New Orleans, La.	.25	1.35	.....	.....	.....	.....
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Los Angeles, Calif.	.....	.85@1.15	1.65	1.65	1.50	1.50
Pueblo, Colo.	1.10*	.90*	.....	1.50*	.....	.....
San Diego, Calif.†	.50@ .70	.80@1.00	1.30@1.60	1.35@1.65	1.10@1.40	1.10@1.40
San Francisco, Calif.	.....	1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.25*	1.25*	1.50*	1.25*	1.25	1.25*
Spring Valley, Calif.	.70	.80	1.40	1.35	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine sand, 1/10 in.	Sand, ¼ in.	Gravel, ½ in.	Gravel, 1 in.	Gravel, 1½ in.	Gravel, 2 in.
Atlanta, Ga.	.30@ .40	.30@ .40	.....	.....	.....	.....
Boonville, N. Y.	.60@ .80	.....	.55@ .75	.....	.....	1.00
Cape Girardeau, Mo.			River sand, .80 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dresden, Ohio	.....	.....	.....	.....	.25	.....
Dudley, Ky. (crushed sand)	1.00	1.00	.....	.90	.....	.....
East Hartford, Conn.			.65 per cu. yd.			
Elkhart Lake, Wis.	.....	.45	.....	.....	.....	.....
Estill Springs, Tenn.	.....	.....	.....	.....	.....	.85
Fishers, N. Y.	.....	.60	.....	.....	.55@ .60	.....
Grand Rapids, Mich.	.....	.....	.....	.....	.....	.60
Hamilton, Ohio	.....	.....	.....	.....	.70	.....
Hartford, Conn.	.....	1.00*	.....	.....	.....	.....
Hersey, Mich.	.....	.....	.....	.50	.....	.....
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas	.....	.95	.....	.....	.....	.55
Mankato, Minn.		All sand and gravel .60 per ton. Pit run gravel, .50				
Moline, Ill.		.60	.60	Concrete gravel, 50% G., 50% S., 1.00		
Montezuma, Ind.			Road gravel .50 per ton			
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75	.....	.....	.50@ .65	.50@ .65
Saginaw, Mich., f.o.b. cars	.....	.75	1.30	1.30	1.30	1.30
St. Louis, Mo.	.....	.....	.....	.....	.....	1.65
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas	.....	.80	.....	1.50	.....	1.30
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.			Washed gravel .50 to .60 a ton			
York, Pa.	.....	.95@1.10	(crushed rock sand)			
Zanesville, Ohio	.....	.60	.60	.....	.....	.....

*Cubic yard. †Low prices, wholesale; high prices, retail; ‡¾ inch down; §⅝ inch and less; ‖2½ inches and less.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Erie, Pa.	Crushed run slag, 4 in. and less, 1.25@1.35						
Emporium, Pa.			1.25	1.25		1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.	All sizes, 1.50, f.o.b. Chicago						
Detroit, Mich.	All sizes, 1.65, f.o.b. Detroit						
Ironton, O.	2.05	1.45	1.80	1.45	1.45	1.45	1.45
Jackson, O.		1.35		1.35	1.35	1.35	1.35
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.50	1.35	1.35	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
Steubenville, Lowellville, Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton and Roanoke, Va.	2.50	.60	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Adams, Mass.			7.00				2.90	
Belletonte, Pa.		10.50*	10.50*	10.50*	9.00		8.50	1.80
Buffalo, N. Y.				12.00				
Berkeley, R. I.			12.00					2.30
Cassadaga, N. Y.			Agricultural marl 7.00					
Lime Ridge, Pa.							5.00a	
West Rutland, Vt.	13.50	12.00					11.00	3.20
West Stockbridge, Mass.								2.25
Williamsport, Pa.			10.00				6.00	
York, Pa. (dealers' prices)		11.50	11.50	12.50			9.50	1.85b
CENTRAL:								
Cold Springs, Ohio	12.50	11.00	10.00		9.00	11.00‖	10.00	
Delaware, Ohio		10.00	9.00	11.00			9.00	1.60
Gibsonburg, Ohio	12.50				9.00			
Huntington, Ind.	12.50	11.00	10.00		9.00	11.00	10.00	1.60c
Luckey, Ohio	12.50‡	11.00	9.00‡					
Marblehead, Ohio		11.00	10.00				10.00	1.60d
Marion, Ohio		11.00	10.00				10.00	1.80†
Mitchell, Ind.				12.00	11.00		10.00	1.60
Sheboygan, Wis.							10.00	
Tiffin, Ohio					9.00	11.00		
White Rock, Ohio	12.50				9.00	11.00		
Woodville, O. (dlrs.' price)	12.50‡	11.00‡	10.00‡				10.00	1.60
SOUTHERN:								
Erin, Tenn.							8.50	1.50
El Paso, Texas					12.00		10.00	1.50
Karo, Va.							7.00	1.50
Knoxville, Tenn.	12.50	11.00	11.00	11.00		11.00	8.50	1.50
Ocala and Zuber, Fla.	14.00	14.00		14.00				1.75
Sherwood, Tenn.	12.50	11.00	11.00	11.00			8.50	1.50
Staunton, Va.					4.50		8.50	1.35
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							12.50	15.00
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.40
Tehachapi, Calif.							13.00	2.05

*Paper sacks; †180-lb. net, non-returnable metal barrel; ‡50-lb. paper bags, terms 30 days net, 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice; ‖ 80-lb. paper bags; (a) F. O. B. kilns; (b) 180 lbs. net; $2.85, 280 lbs. net; (c) wooden bbls.; (d) wooden, 1.60, steel, 1.80.

Miscellaneous Sands

(Continued from preceding page)

Columbus, Ohio—Core	.40@	2.00
Molding fine, brass molding	2.00@	2.50
Furnace lining	1.75@	2.50
Sand blast	3.50@	5.50
Stone sawing	1.50@	2.00
Traction	.50@	.75
Molding coarse	1.75@	2.00
Delaware, N. J.—Molding fine		2.00
Molding coarse		1.90
Brass molding		2.15
Dunbar, Pa.—Traction		2.50
Dundee, Ohio.—Glass, core, sand blast traction		**2.50**
Molding fine, brass molding (plus 75c for winter loading)		**2.00**
Molding coarse (plus 75c for winter loading)		**1.75**
Eau Claire, Wis.—Sand blast	3.00@	3.25
Traction	.35@	.40
Falls Creek, Pa.—Molding, fine and coarse		**1.75**
Sand blast		**2.00**
Traction		**1.75**
Franklin, Pa.—Core		**2.00**
Furnace lining		**2.50**
Molding fine and coarse		**2.00**
Brass molding		**2.00**
Greenville, Ill.—Molding coarse	1.30@	1.60
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled		**.80**
Bank run		**.65**
Kansas City, Mo.—Missouri river core		.80
Kasota, Minn.—Molding fine	1.60@	1.85
Molding coarse, stone sawing	1.45@	1.75
Klondike, Pacific, Gray Summit, Mo.—Molding fine and coarse, stone sawing, roofing sand		2.00
Mapleton Depot, Pa.—Brass molding		2.00
Molding fine		2.00
Roofing sand		2.50
Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse; damp, 2.00; dry		**2.75**
Massillon, Ohio—Molding fine, coarse, furnace lining and core		3.00
Traction		2.75
Michigan City, Ind.—Core, traction		.50
Millville, N. J. Core		2.00
Mineral Ridge, Ohio.—Core, furnace lining, molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding (green)		2.25
Montoursville, Pa.—Core	1.35@	1.50
Traction		1.25
New Lexington, Ohio—Molding fine		2.25
Molding coarse		2.00
Oregon, Ill.—Core	**1.50@**	**2.00**
Sand blast		**4.00**
Stone sawing	**2.00@**	**2.50**
Ottawa, Ill.—Core	1.50@	2.50
Furnace lining and traction		1.50
Roofing sand		1.50
Sand blast		4.50
Stone sawing		4.50
Brass molding		2.50
Molding, coarse (crude)	.85@	1.00

Miscellaneous Sands

(Continued)

Ottawa, Minn.—Crude silica sand	.75@	1.00
Ridgway, Pa.—Core		2.00
Furnace lining, molding fine, molding coarse		1.25
Traction		2.25
Rockwood, Mich.—Core	1.75@	2.50
Roofing		2.75
Sand blast		3.75
Round Top, Md.—Molding fine		1.60
Traction		1.75
Roofing sand		2.25
San Francisco, Calif. (washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@	3.50
(Direct from pit)		
Furnace lining, molding coarse, sand blast		**3.60**
Stone sawing, traction		**2.30**
St. Louis, Mo.—Red heavy molding	1.50@	2.25
Red fine	1.50@	2.00
Molding fine and brass	2.00@	3.00
Skein core	1.75@	2.25
White core sand	1.00@	1.75
Sand blast	2.00@	4.50
Furnace lining	1.50@	2.50
Roofing sand	1.00@	1.50
Stone sawing	1.25@	2.00
Thayers, Pa.—Core		2.00
Furnace lining, molding fine and coarse		1.25
Traction		2.00
Utica, Ill.—Core, molding fine, molding coarse	.85@	1.50
Furnace lining		1.25
Roofing sand, stone sawing	1.40@	2.50
Traction, brass molding		1.40
Sand blast		2.50
Warwick, Ohio.—Furnace lining, dry 1.75, green		2.00
Molding fine and coarse, dry 2.50; green		1.75
Traction and brass molding		2.50
Core, dry	2.50@	2.75
Core, green		1.75
Zanesville, Ohio—Molding fine, brass molding	1.50@	1.75
Molding coarse		1.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Asheville, N. C.—Best white and 200-mesh (per ton)		8.00
Yellow (per ton)		9.00
Red (per ton)		13.00
Baltimore, Md.—Crude talc (mine run)		3.50
Ground talc (20-50 mesh), bags		10.00
Ground talc (150-200 mesh), bags		12.00
Cubes		60.00
Blanks (per lb.)		.08
Chatsworth, Ga.—Crude talc		4.50
Ground talc (150-200 mesh), bags	8.00@	12.00
Chester, Vt.—Crude talc	3.50@	4.00
Ground talc (150-200 mesh), bulk	6.50@	8.50
Including bags	7.50@	9.50
Emeryville, N. Y.—325 mesh		14.75
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags		18.00
Henry, Va.—Crude talc (lump mine run) per 2000-lb. ton	3.00@	3.50
Ground (20-50 mesh), bags	6.50@	8.00
(150-200 mesh), bags	9.75@	12.50
Keeler, Calif., bulk	20.00@	30.00
Los Angeles, Calif.—Crude	15.00@	22.00
Marshall, N. C.—Crude talc		4.50
Ground talc (150-200 mesh), bags	8.00@	12.00
Mertztown, Pa.—Ground talc (20-50 mesh); bulk, 5.00; bags		6.00
(150-200 mesh); bulk, 7.00; bags		8.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@	13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@	10.00
Ground talc (150-200 mesh), bulk	10.00@	22.00
Vermont—Ground talc (20-50 mesh); bags	7.50@	10.00
Ground talc (150-200 mesh); bags	8.50@	15.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk		5.00
(Bags 1.00 extra)		
Ground talc (150-200 mesh), bulk	8.00@	14.00
(Bags 1.00 extra)		
Pencils and steel workers' crayons, per gross	1.20@	2.00

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton		
Centerville, Tenn.—B.P.L. 65%	6.00@	8.50
Gordonsburg, Tenn.—B.P.L. 68-72%	5.50@	6.00
Mt. Pleasant, Tenn.—Analysis, 65% B.P.L. (2000 lb.)	6.00@	6.50
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		7.00
Paris, Idaho.—2000 lb. mine run, B.P.L. 75%	4.50@	5.00
Ottawa, Minn.—All crude silica sand	.75@	1.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$8.40	$8.10	$7.50
24x14	10.20	8.40	8.10	7.50
22x12	10.80	8.70	8.40	7.80
22x11	10.80	8.70	8.40	7.80
20x12	12.60	9.00	8.70	8.10
20x10	12.60	9.00	8.70	8.10
18x10	12.60	9.00	8.70	8.10
18x 9	12.60	9.00	8.70	8.10
16x10	12.60	8.70	8.40	7.80
16x 9	12.60	8.70	8.40	7.80
16x 8	12.60	8.70	8.40	7.80
18x12	12.60	9.00	8.70	8.10
16x12	12.60	8.70	8.40	7.80
14x10	11.10	8.40	8.10	7.50
14x 8	11.10	8.40	8.10	7.50
14x 7 to 12x6	9.30	8.10	7.50	7.50
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. ton	
Barton, Fla.—Analysis, 50-65% B.P.L.	3.50@ 8.00
Centerville, Tenn.—B.P.L., 65%	6.50*
Benotis, Fla.—Analysis 77-82% B.P.L.	8.00
Montpelier, Idaho. — Analysis, 72% B.P.L., crushed and dried	3.75
Mt. Pleasant, Tenn.—B.P.L. 65%	6.50
Twomey, Tenn.—B.P.L. 65%	6.00@ 6.50

*Less $1.00 per ton dealer commission.

Florida Soft Phosphate

(Raw Land Pebble)

Per Ton

Benotis, Fla.—Analysis 26-28% phosphoric acid—200 lb. sacks, carload lots	10.00
Florida—F. O. B. mines, gross ton, 68/66% B.P.L.	3.25
70% min. B.P.L.	3.55
72% min. B.P.L.	3.85
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

Per Ton

Jacksonville, Fla., District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65% B.P.L.	5.75

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	22.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	23.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Slate granules		6.50@ 7.00
Granville, N. Y.—Red slate granules		7.50
Harrisonburg, Va.—Blk. marble (crushed, in bags)		12.50@18.50
Ingomar, Ohio (in bags)		8.00@25.00
Milwaukee, Wis.		14.00@26.00
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsburg, N. J.—		
Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Poultney, Vt.—Slate granules		7.50
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.— (2000 lb.)		8.00@20.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b., bags 12½c extra	4.50	4.50

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Carpenterville, N. J.	19.00	31.50@45.00
Easton, Pa.	16.00	40.00@60.00
Eau Claire, Wis.	15.00@20.00	25.00@40.00
Ensley, Ala.	16.00	26.00
Eugene, Ore.	25.00@26.00	50.00@75.00
Friesland, Wis.	22.00	32.00
Houston, Tex.		19.50
Omaha, Neb.	18.00	30.00@40.00
Portland, Ore. (Del'd)	21.00	30.00@60.00
Puyallup, Wash.	20.00	60.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@40.00
Salem, Ore.	25.00	35.00@50.00
Salt Lake City, Utah	17.00@18.00	35.00@40.00
Springfield, Ill.	18.00	20.00@25.00
Wauwatosa, Wis.	15.00@16.00	28.00@65.00
Watertown, N. Y.	18.00@21.00	35.00@37.00
Winnipeg, Can.	18.00	26.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	11.00
Boston, Mass.	15.00@16.50
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	11.50
Lancaster, N. Y.	15.00
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	14.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Rives Junction, Mich.	12.00
Saginaw, Mich.	12.00
San Antonio, Texas	13.00
San Antonio, Texas (deliv. city lts.)	13.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	20.00
F.o.b. cars	15.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	23.00	14.50
Baltimore, Md.	24.25	17.85
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	20.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	21.00	20.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	21.00
New York, N. Y.	18.20	13.10
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	.....
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots.

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	3.00
Boston, Mass.	.....	2.68@2.78
Buffalo, N. Y.	.....	2.53
Cedar Rapids, Iowa	.62	2.48
Cincinnati, Ohio	.63½	2.54
Cleveland, Ohio	.61½	2.46
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.49
Dallas, Texas.	.56¼	2.25
Davenport, Iowa	.60¾	2.43
Dayton, Ohio	.....	2.48
Denver, Colo.	.....	2.84
Detroit, Mich.	.62	2.48
Duluth, Minn.	.56¼	2.25
Indianapolis, Ind.	.60¾	2.41
Kansas City, Mo.	.61¼	2.45
Los Angeles, Cal. (less 5c dis.)	.....	3.16
Memphis, Tenn.	.....	2.85
Milwaukee, Wis.	.59¼	2.37
Minneapolis, Minn.	.62½	2.50
Montreal, Canada (sks. 20c ext.)	.....	2.25
New Orleans, La.	.....	2.90
New York, N. Y.	.....	2.30
Philadelphia, Pa.	.....	2.96
Phoenix, Ariz.	.....	3.30
Pittsburgh, Pa.	.56	2.24
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.63*
St. Louis, Mo.	.58¾	2.45
St. Paul, Minn.	.62½	2.50
Seattle, Wash. (10c bbl. dis.)	.....	2.90
Spokane, Wash.	.....	.....
Toledo, Ohio	.62	2.48

†Sack 10c ext.; 10c dis. 10 days.
*Warehouse, 3.15.
NOTE—Add 40c per bbl. for bags.

Mill prices f. o. b. in Carload Lots to Contractors	Per Bag	Per Bbl.
Buffington, Ind.	.48¾	1.95
Cincinnati, Ohio	.....	3.00†
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.15
Dayton, Ohio	.....	2.85†
El Paso, Tex.	.....	3.20*
Hannibal, Mo.	.....	2.10
Hudson, N. Y.	.....	2.20
Indianapolis, Ind.	.....	2.96†
Leeds, Ala.	.....	2.20
Los Angeles, Calif.	.....	2.80
Louisville, Ky.	.....	2.52
Memphis, Tenn.	.....	3.24†
Northampton, Pa.	.....	2.10
Phoenix, Ariz.	.....	4.30‡
Steelton, Minn.	.51½	2.06
Universal, Pa.	.50	2.00

†Including cloth sacks.
*Gross, 10c sacks and 10c per bbl. disc 10 days.
‡Gross, 15c sacks and 5c per bbl. disc. 10 days

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	Plaster Board ⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	.....	6.00	6.00	.....	13.00	.....	.....	.....	.....	.....	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	.....	5.00	10.00	10.00	10.00	.....	.....	31.00	.....	19.75	20.00	30.00
Hanover, Mont.	4.50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00	.....	.....	10.00	11.00	11.50	.....	.....	33.75	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	16.40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags, $1.50 per ton extra (not returnable).
*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding $0c per ton

News of All the Industry

Incorporations

Bode Gravel Co., San Francisco. Capital stock $50,000; shares 500, subscribed $300. Subscribers: E. D. Connolley, H. W. Bode, M. Bode, one share each; attorney, Walter E. Drobish, Mills building, San Francisco.

Federal Sand and Gravel Co., C. N. McNulty, L. B. Harrington and M. F. McNulty, incorporators; capitalization $25,000; seat of business, Denver.

Kinney Sand Co. has been organized at Benton Harbor, Mich., with $40,000 capital. Vere Beckwith, former cashier of the Eau Claire bank, is secretary-treasurer.

Reid Gravel Cleaner Co. Deal in machine for the cleaning of sand and gravel. Joe H. Reid, Cal Williams, J. H. Watherford, Memphis, Tenn.; $100,000.

Indianapolis Oolitic Stone Co. has been incorporated for $500,000 to operate quarries in the Bedford limestone district. John W. Easton, Stinesville, Ind., is president.

King Partition Block Corp., New York, has been incorporated with $15,000 capital stock and will manufacture cement blocks. Plans are not definite. Frederick L. Keppler, formerly of the Keppler-Blair Construction Co., who now is located at 1799 First avenue, heads the company.

Reliable Material Co., headquarters at 7650 South Chicago avenue, Chicago. The capital stock is $15,000, and the incorporators are A. M. Rogers, Joseph Druecker and Elmer Engquist. The company is engaged in buying and selling stone, sand and gravel.

Acker Cement Products and Supply Co., Fort Wayne, Ind.; capital, $25,000; building materials. Directors: C. W. McKee, E. H. Tielker, F. W. Tielker, Russell Acker.

Lassig Limestone Quarry Corp., Houston, Texas; capital stock, $25,000. Incorporators: Oswald Lassig, Louis Lassig and E. G. Zachary.

Sunset Rock Co., Los Angeles; capital stock, $100,000; shares 1000, subscribed $500.

Michigan Lime and Fertilizer Co., 410 Dwight building, Jackson, Mich., has been incorporated with a capital stock of $300,000, of which $200,000 is preferred stock.

Tacoma Concrete Products Co. has been incorporated in Tacoma, Wash., with a capital of $6000 by Oscar F. Holt, M. J. Smith and Arthur Smith.

North Trunk Sand and Gravel Co. has been incorporated in Seattle, Wash., with a capital of $10,000 by James R. Binyon and Paula M. Binyon.

M. S. Cohn Gravel Co. has been incorporated in Fort Smith, Ark., with a capital of $15,000 by M. S. and W. V. Cohn.

Keystone Manufacturing Co. has been incorporated in Grass Lake, Mich., with a capital of $3000 to manufacture cement blocks.

Centerville Granite and Marble Works has been incorporated in Centerville, Ia., with a capital of $25,000 by T. E. Lee and J. Turner.

Cristoffel Concrete Products Co. has been incorporated in Milwaukee, Wis., with a capital of $50,000 to manufacture and deal in concrete bricks, sewer pipes, etc., by John Cristoffel, 1023 18th street, and others.

Builders Crushed Rock Products Co. has been incorporated in Los Angeles, Calif., with a capital stock of $250,000. The directors are: Geo. W. Kelsey, Fred M. Clark, Mart Adson, Ray T. Savage, Hyrum Ricks, Jr., G. T. Harding and J. R. Shumaker.

Ozark Cement Co. has been incorporated in Joplin, Mo., with a capital stock of $10,000 by Geo. N. Spiva, P. C. Pate and others.

Taylor-Lutes Gravel Co. has been incorporated in Lutesville, Mo., a capital of $33,000 by Omer Lutes, C. A. Walker and others.

Hancock County Chert Gravel Co. has been incorporated in Hawesville, Ky., with a capital of $30,000 by G. W. Newman of Hawesville and J. R. Skillman of Louisville, Ky.

Old Monroe Gravel Co. has been incorporated in Old Monroe, Mo., with a capital stock of $7000 by Henry Holtzman, J. J. Connoughton and J. W. Whalen.

Sand and Gravel

Arkansas River Sand Co. has begun operations at its No. 2 plant across the river from Sand Springs, Okla., to supply trade on the Frisco railway. The plant has a 15-car capacity.

De Witt County Sand and Gravel Co. has resumed operations at its plant at Clinton, Ill., after a short delay for making improvements in the plant.

For the furnishing of approximately 2000 tons of sand for the filtration beds at the filtration plant, the city council recently authorized City Clerk Harry Denton to advertise for bids, returnable October 4. An investigation of the available sand supply has been made by Resident Engineer George J. Calder, and it has been found that the sand is available on the Pacific coast. The early date for the return of bids is asked in order that delivery can be made in time to place the sand in the filtration beds for the opening of the filtration plant in a few weeks.—Sacramento, Calif., Bee.

Defrain Sand Co. will supply 10,000 tons of pebbles and 8000 tons of sand for use in the construction of the new terminal of the Philadelphia & Reading railway's seashore lines in Camden.

Sound Sand and Gravel Co. has been organized in seattle, Wash., with plant at Lake Union, by A. S. Kerry and W. R. Chesley.

Standard Rock and Gravel Co. has taken over the property of the Burbank Rock and Gravel Co. which operated plants in Burbank and Roscoe, Calif. Mr. Houle of the Burbank company has become vice-president and manager of the Standard company.

Thermic Coal and Supply Co. of Hollidaysburg, N. Y., of which John B. Elliott is manager, has about completed the installation of one of the largest sand operations in the state on its property in Frankstown township, adjoining the Brua fruit farm. The lumber for the construction of the plant was obtained from the company's own saw mill placed on the land, timber on the property being converted into building material. There has been installed a modern, fuel oil, 75-hp. engine of Fairbanks-Morse make, a No. 5 Champion crusher, a 10-ft. Stephenson dry grinding pan, elevators, screens, bins and all other necessary apparatus.

Waupaca, Wis., Sand and Gravel Co. writes to this column that the statement made in the last issue as to the suit brought by the county commissioners was not correct. The commissioners asked for an injunction enjoining the company from undermining the natural support of the highway, which injunction was made permanent by the consent of the company. The company did not cease operating for a minute and says it does not expect to in the next 10 years.

Quarries

Alexander & Black, Ft. Worth, Texas, are developing a marble quarry near Santa Fe, Texas.

Wheeling Steel Corp. has purchased a 99-acre farm, situated four miles from Martinsburg, W. Va., and known to contain valuable deposits of limestone. It is understood that the company expects to quarry the stone and transport it to its mills in this district, particularly the La Belle plant.

Union Rock Co. of Azusa, Calif., is about to begin the construction of buildings to cost $50,000.

Fairfax Pink Granite Co., recently incorporated in Cherrydale, Va., has been organized with John T. Mallon as president and manager and John G. Dudley as secretary and treasurer. Has nine acres under development, with quarry machinery, but will later add a rock crusher and electrical equipment.

E. C. Davis has engaged in business in La Grande, Ore., as the Blue Mountain Marble and Granite Co.

Rockville Granite Co., Cold Springs, Minn., has begun the extension of a 225-ft. addition to its plant.

Atlas Mixed Mortar Co. of Los Angeles, Calif., has taken over the plant of the La[illegible] Moore Co., which includes a rock crusher in Stough Canyon. G. W. Moore will remain as manager of the plant, which will be enlarged.

R. L. Hopkins, Huntsville, Ala., has purchased the plant of the Southern Stone and Marble Co. and will consolidate with the Lee street plant.

Cement

Phoenix Portland Cement Co.'s burned stockhouse at Minneapolis is being replaced by a new structure built by the Bland Engineering Co.

Diamond Portland Cement Co. is building a new stockhouse at Middle Branch, Ohio.

Homer M. Hadley, district engineer in charge of the Portland Cement Association office at Seattle, sailed for Japan October 5 to make a thorough investigation of how modern structures, particularly those consisting largely of reinforced concrete, withstood the recent earthquake.

Sun Portland Cement Co., which has a plant at Lime, Ore., with a capacity of 1250 bbl. per day, has opened offices at 12 Porter Bldg., Portland, Ore. H. A. Ross is president.

Pacific Portland Cement Co.'s new plant at Redwood City, Calif., is expected to be in operation in about seven months.

Statement of Ownership of Rock Products

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of ROCK PRODUCTS, published every other week at 542 S. Dearborn St., Chicago, Ill., for October 1, 1923. State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared George P. Miller, who, having been duly sworn according to law, deposes and says that he is the manager of ROCK PRODUCTS, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Corp.; Editor, Edmund Shaw; Managing Editor, Nathan C. Rockwood; Business Manager, George P. Miller.

2. That the owners of 1 per cent or more of the total amount of stock are: Tradepress Publishing Corp., W. D. Callender, T. J. Sullivan, George P. Miller, N. C. Rockwood, W. B. Mayer, D. R. Hicks, H. P. Sessions, and C. O. Nelson, all at 542 S. Dearborn St., Chicago, Ill.

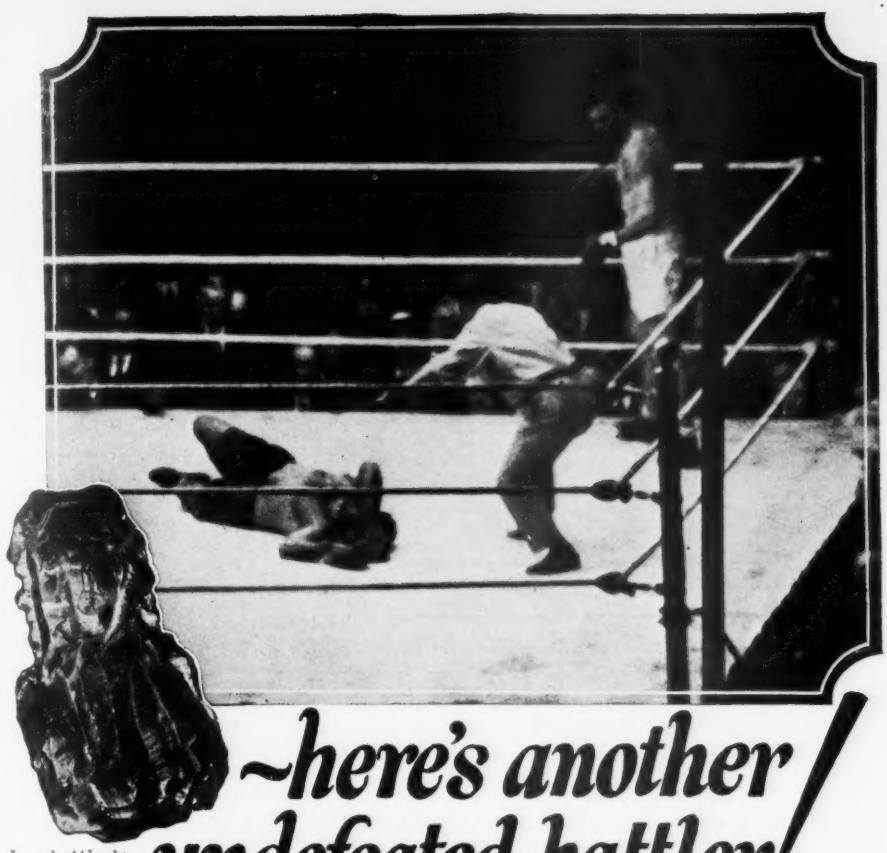
3. That there are no bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

GEO. P. MILLER,
Business Manager.

Sworn to and subscribed before me this 29th day of September, 1923.

(SEAL) CHARLES O. NELSON.
(My commission expires April 6, 1926.)



In a battle between this cap screw and a crusher, the screw was chewed up . . but you ought to see the other fellow.

~here's another undefeated battler!

TRAMP IRON, too, is a champion. No crusher has ever licked it. For the first few rounds, the crusher may be lucky and get by without being badly hurt. Sooner, or later, though, tramp iron delivers the knockout blow.

There's one way to keep tramp iron from damaging rock crushers—stopping production. When you stack it up against the Dings "High Intensity" Magnetic Pulley, it's fighting out of its class. Dings blocks every blow. Tramp iron is dethroned; it has met its master.

The bulletin will tell the story—it's free.

Dings Magnetic Separator Co.
803 Smith St., Milwaukee

Dings High Intensity MAGNETIC SEPARATION

Dempsey Wins!

ON Friday, September 14th, at the Polo Grounds in New York, Jack Dempsey, world's champion heavyweight, knocked out Luis Firpo in the second round. Jack seems to be a real champion. No other boxer threatens his laurels seriously.

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RICHMOND
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BIRMINGHAM
Brown-Marx Bldg.
LOS ANGELES
San Fernando Bldg.
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1522 Oliver Bldg.

R.P. 10-20-23

Dings Magnetic Separator Co.
803 Smith St., Milwaukee
Please send me the free pulley bulletin.

Firm.....

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.....

Att'n.....

Agstone

New Point Ground Limestone Co. stockholders elected the following new officers: President, Anthony Habig; vice-president, Frank Kramer; secretary-treasurer, George F. Redelman. This company was organized for the benefit of the farmers of Decatur county to build up their land at a minimum cost. The product shows a high quality, being about 95 per cent soluble, with a high per cent of calcium. The company has a large stock ready for the farmers of this county.

Mercer County Farm Bureau has received word from the transportation department of the Illinois Agricultural Association that the Rock Island railroad has made reductions of rates on agricultural limestone moving from Buffalo and Linwood, Iowa, to C. B. & Q. destinations in northern Illinois.

Through the courtesy of the Baltimore & Ohio railroad, six Dekalb county farmers are to receive six tons of ground limestone each, to be used on land where sweet clover will be sown next spring. These men are co-operating with County Agent B. H. Repp in arranging to demonstrate the value of the limestone in getting a good stand of legumes, the first step in better farming.

Concrete Products

Collins Concrete Pipe Co. has established its business at its new plant at 410 River street, Portland, Ore.

C. M. Long has moved his concrete products manufacturing plant from Kent to Auburn, Wash.

Hollow Cement Tile Co. has been organized and will manufacture concrete products on Concord street in South Park, Minn., south of St. Paul. Albert Braun is superintendent and Steve Skorich is secretary, while Filbert Gabris will be sales manager. The plant is located close to the pit of the United Materials Co., from which it will get its sand.

Gerke's Concrete Block Works, Merrill, Wis., has begun the erection of a two-story 32x72-ft. addition to its plant, and also a garage and boiler room.

Gulf Concrete Pipe Co., Houston, Texas, of which N. A. Eppes is president, is to erect a two-story concrete building at a cost of $20,000.

Horicon Sand, Gravel and Tile Co. of Fond du Lac, Wis., has been awarded the contract to furnish tiling for 11 acres of land to be tiled on the Dodge County poor farm, which work is to be completed this fall.

Gypsum

Certainteed Products Corp. is about to erect a two-story cement plaster mill in Grand Rapids, Mich., to cost $200,000. Contract for structure let.

Gyp Valley Plaster Co. of Fairvalley, Okla., has been organized to develop a gypsite deposit in Woods county. Dwight C. Spray is secretary, Ponca City, Okla.

Certaineed Products Co. of St. Louis, Mo., has opened a sales office in the Porter building, Portland, Ore., with E. E. Lipe in charge.

Jas. A. Lindsey is opening a gypsum quarry near Rule, Texas.

Sand-Lime Brick

McMurray Asphaltum and Oil, Ltd., of Waterways, Alberta, Canada, are operating a plant for the purpose of utilizing the immense tar sand deposits of that region for paving purposes and also for the extraction of oil.

Trade Literature

Making Leather Belts Endless is a remarkably good treatise on the care and joining of leather belts published by the Leather Belting Exchange (Philadelphia). It is not an advertisement in the usual sense of the word, but a real help to men who have leather belts in their charge.

Richard W. Yates, former general manager of Link-Belt Co.'s Philadelphia plant, has been appointed treasurer of the Link-Belt Co.

Denver Fire Clay Co. issues a new catalog which is an exceptionally handsome piece of book making. It includes all their products such as refractories, assayer's supplies, etc.

Lubrication is the title of an excellent little monthly technical publication on lubricants and their uses put out by the Texas Co.

Concrete Tile for Land Drainage is the title of an excellent booklet on the proper installation and use of concrete tile drains issued by the Portland Cement Association. It is well illustrated.

The Reeves Brothers Co., of Alliance, Ohio, one of the oldest concerns building steel tanks and oil refinery equipment, cement and mining machinery, and creosoting plants, announces, effective October 1, 1923, an office at 2012 L. C. Smith building, Seattle, Wash., from which all Western business will be handled. Percy E. Wright, consulting mechanical engineer, has been appointed assistant sales manager of the company and will be in charge of the office. Mr. Wright has been a resident of the Northwest for a number of years and is well and favorably known to the trade.

"Rotex" is the title of a very handsome and well-written catalog published by the Orville Simpson Co. It describes the Rotex sifters, or screens, which are familiar to most of our readers.

Manufacturers

Meese & Gottfried, widely known on the Pacific coast as dealers and distributors of power and conveying machinery and the like, have sold to the Link-Belt Co. The business will hereafter be known as Link-Belt Meese & Gottfried Co. with headquarters at San Francisco. Los Angeles, Seattle and Portland offices will be continued.

Mid City Engineering Corp., 104 North Franklin street, Chicago, has been organized for excavating and construction work.

Rupert M. Gay Co., 114 Liberty street, New York, has changed its name to the Rupert M. Gay Co., Inc.

John H. Jones, president of the Bertha-Consumers Co. of Pittsburgh, Pa., accompanied by his son, Marshall J. H. Jones, chairman of the Mines Committee, spent the past week visiting the Elsie mines of the company in the Hazard No. 4 district of Kentucky. The Bertha-Consumers Co. has just placed 300 new 55-ton, two-door steel hopper railroad cars at its Elsie mines, Elsiecoal, Ky., on the Louisville & Nashville railroad. New shaker screen equipment has been installed at these mines and a number of new houses have been completed to take care of an enlarged working personnel.

Oil Shale

Union Oil Co. of California has invested, up to the present time, a million dollars in Colorado oil shale land. The company's holdings approximate 20,000 acres. The richest stratum of commercial thickness yields 63.175 gal. of oil to the ton. The company is preparing to expend at once $25,000 in surveys and development work.

Magnesite

American Magnetstone Corp. of California, a branch of the American Magnetstone Corp. of Illinois, has been incorporated for $700,000. W. E. Trautman of Los Angeles is president.

Slag

National Slag Co. announces the removal of the Philadelphia office to room 1000, Jefferson Bldg., Philadelphia.

Obituary

Leet E. Denton, vice-president and general manager of the Federal Sand and Gravel Co., died Friday, October 5, at his home in Saginaw, Mich.

Colorado Oil Shales

THE main oil shale activity in Colorado recently has been the development of individual holding through the annual assessment work. The retorts of the Monarch Oil Shale Co. and the Index Co., both at De Beque, are operating intermittently. The extent of the oil shale deposit in Colorado is so vast that it can be pictured only with difficulty e. g. if 100 plants were in operation, each treating 2000 tons of oil shale a day, it would require 800 years to exhaust the available supply now known to exist in Colorado.

Professor A. J. Franks, at the Colorado School of Mines, experimenting on crude Colorado shale oil, from the Ginet plant of the Monarch Oil Shale Co. at De Beque, in the chemical laboratory, has obtained the following yields of the unrefined fractions expressed as percentages of the original crude oil by volume:

Product	By fractional distillation Pct.	By cracking heavy oils Pct.	Totals Pct.
Gasoline—to 200 deg. C.....	20	16	36
Kerosene—200-250 deg. C...	18	9	27
Fuel oil—250-320 deg. C.....	27	....	....
Lub. oil 320—Dryness.....	22	....	....
Gas and coke—(By difference.....	13	24	37
	100		100

He draws the following conclusions:

a. Under present economic conditions, the greatest possibilities of oil shale seem to lie in the production of gasoline, kerosene, flotation oils and coke.

b. A high-grade water-white gasoline can be produced from Colorado shale oil.

c. This product can be made without sustaining an excessive refining loss if the proper method of refining is used.

d. At least 31.7 per cent of the crude oil may be converted into this refined water-white gasoline if the heavy oils are cracked, but a greater percentage is very likely to be obtained.

e. The gasoline made by cracking the heavy oils is superior to that obtained by fractional distillation of the crude oil.

California Silica Sand to Be Used Instead of Imported

THE Technical Glass Co., of Los Angeles, is producing 45,000 flint-glass doorknobs daily, in hundreds of different sizes and patterns. This fact was brought to light recently by the purchase of a tract of land on East 48th street and the announcement that the Austin Company of California has begun the erection of a new factory plant of modern steel, brick, terra cotta and glass construction.

Of importance to local industry is the fact that it is proposed to dispense in the near future with the use of silica sand imported from Belgium. Experiments with local sands have resulted in the discovery of a deposit containing material which is superior to the best foreign sand imported for glass making.

The Iron That Lasts

ARMCO-Ingot Iron is not made to meet a price but to give long and satisfactory service. It is the world's purest commercial iron and this purity not only insures long life, but enables the metal to take an exceptionally pure coating of zinc, which further adds to its resistance to rust and corrosion.

It is certainly not economy to use the cheapest sheet metal you can buy. Failures are costly because the metal must be replaced and the original labor cost is entirely lost.

You will find it economical to use ARMCO-Ingot Iron. Identify the material by the blue ARMCO triangle stenciled on every sheet.

The American Rolling Mill Co.

Middletown, Ohio

ARMCO INGOT IRON

Buyers' Directory
of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

Air Compressors
Pennsylvania Pump & Compressor Co., Easton, Pa.
Smokeless Oil Burner Co., Bucyrus, Ohio
Worthington Pump & Mchy. Corp., New York

Air Separators
Rubert M. Gay Co., Inc., New York, N. Y.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mchy. Co., Kingston, N. Y.

Augers
Howells Mining Drill Co., Plymouth, Pa.

Automatic Weighers
Merrick Scale Co., Passaic, N. J.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Babbitt Metal
Ajax Metal Co., Philadelphia, Pa.

Bags and Bagging Machinery
Jaite Co., Jaite, Ohio
Valve Bag Co. of America, Toledo, Ohio

Balls (Tube Mill, etc.)
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Worthington Pump & Mchy. Corp., New York

Belting
New York Belting & Packing Co., New York City

Belting (Steel Conveyor)
Sandvik Steel, Inc., New York, N. Y.

Belt Fasteners and Hooks
Crescent Belt Fastener Co., New York City

Belt Lacing and Rivets
Crescent Belt Fastener Co., New York City

Bins and Bin Gates
Austin-Western Road Machinery Co., Chicago, Ill.
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Blasting Powder
E. I. du Pont de Nemours & Co., Wilmington, Del.

Boiler Insulation
Celite Products Co., Chicago, Ill.

Boilers (Water Tube)
Jackson & Church Co., Saginaw, Mich.

Box Car Loaders
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Brick (Insulating)
Celite Products Co., Chicago, Ill.

Brick Machinery
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Jackson & Church Co., Saginaw, Mich.
Shope Brick Co., Portland, Ore.

Buckets (Dumping)
Penn Fdy. & Mfg. Co., Reading, Pa.

Buckets (Elevator and Conveyor)
American Manganese Steel Co., Chicago Heights, Ill.
Austin-Western Road Machinery Co., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., Columbus, Ohio
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Buckets (Grab, Clamshell, etc.)
Browning Co., Cleveland, Ohio
Clyde Iron Works Sales Co., Duluth, Minn.
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, Ohio
Orton & Steinbrenner, Chicago, Ill.

Burr Mills
J. B. Ehrsam & Sons, Mfg. Co., Enterprise, Kan.

Cableways
Clyde Iron Works Sales Co., Duluth, Minn.
Interstate Equipment Corp., New York, N. Y.

Calcining Kettles (Gypsum)
American Process Co., New York, N. Y.
J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kan.

Car Movers
Atlas Railway Supply Co., Chicago, Ill.

Car Pullers
Ottumwa Box Car Loader Co., Ottumwa, Iowa
Thomas Elevator Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Cars (Quarry)
Koppel Ind. Car & Equipment Co., Koppel, Pa.
Penn Fdy. & Mfg. Co., Reading, Pa.

Cement (Insulating)
Celite Products Co., Chicago, Ill.

Chain (Steam Shovel)
Carroll Chain Co., Columbus, Ohio

Chain Drives
Link-Belt Co., Chicago, Ill.

Coal Pulverizing Equipment
Fuller-Lehigh Co., Fullerton, Pa.
K-B Pulverizer Co., New York City
Rubert M. Gay Co., Inc., New York, N. Y.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.

Conveyors and Elevators
Austin-Western Road Machinery Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, Ohio
Kennedy-Van Saun Mfg. & Engineering Corp., New York City
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
W. Toepfer & Sons Co., Milwaukee, Wis.
United Iron Works, Inc., Kansas City, Mo.
Universal Crusher Co., Cedar Rapids, Iowa
Universal Road Mchy. Co., Kingston, N. Y.

Couplings
Knox Mfg. Co., Philadelphia, Pa.

Cranes (caterpillar)
Byers Machine Co., Ravenna, Ohio
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Cranes (Locomotive)
American Hoist & Derrick Co., St. Paul, Minn.
Browning Co., Cleveland, Ohio
Byers Machine Co., Ravenna, Ohio
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, Ohio
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Cranes (Overhead Electric Traveling)
Morgan Engineering Co., Alliance, Ohio

Crushers (Hammer)
Jeffrey Mfg. Co., Columbus, Ohio
Pennsylvania Crusher Co., Philadelphia, Pa.

Crushers (Jaw and Gyratory)
Acme Road Machinery Co., Frankfort, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Austin-Western Road Machinery Co., Chicago, Ill.
Earle C. Bacon, Inc., New York, N. Y.
C. G. Buchanan Co., New York City
J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kan.
Rubert M. Gay Co., Inc., New York, N. Y.
Kennedy-Van Saun Mfg. & Engineering Corp., New York City.
Morgan Engineering Co., Alliance, Ohio
New Holland Machine Co., New Holland, Pa.
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
United Iron Works, Inc., Kansas City, Mo.
Universal Crusher Co., Cedar Rapids, Iowa
Universal Road Mchy. Co., Kingston, N. Y.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo. (Jaw)
Worthington Pump & Mchy. Corp., New York

Crusher Protectors
Dings Magnetic Separator Co., Milwaukee, Wis.

Crushing Rolls
C. G. Buchanan Co., New York City
Kennedy-Van Saun Mfg. & Engineering Corp., New York
McLanahan Stone Mach. Co., Hollidaysburg, Pa.
New Holland Machine Co., New Holland, Pa.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
United Iron Works, Inc., Kansas City, Mo.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo.
Worthington Pump & Mchy. Corp., New York

Derricks
Clyde Iron Works Sales Co., Duluth, Minn.
McMyler Interstate Co., Cleveland, Ohio
Thomas Elevator Co., Chicago, Ill.

Dippers and Teeth (Steam Shovel)
American Manganese Steel Co., Chicago Heights, Ill.
Marion Steam Shovel Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Draglines
Erie Steam Shovel Co., Erie, Pa.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Dragline Cableway Excavators
Browning Co., Cleveland, Ohio
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.

Dredge Chain
Carroll Chain Co., Columbus, Ohio

Dredges (Hydraulic)
Ellicott Machine Corp., Baltimore, Md.

Dredges (Sand and Gravel)
American Manganese Steel Co., Chicago Heights, Ill.
Ellicott Machine Corp., Baltimore, Md.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Morris Machine Works, Baldwinsville, N. Y.
Thomas Elevator Co., Chicago, Ill.

Drills (Air and Electric)
Howells Mining Drill Co., Plymouth, Pa.

Drills (Blast Hole)
Howells Mining Drill Co., Plymouth, Pa.
Sanderson-Cyclone Drill Co., Orrville, Ohio

Drills (Hand)
Howells Mining Drill Co., Plymouth, Pa.

Drill Steel
Colonial Steel Co., Pittsburgh, Pa.

Dryers
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Process Co., New York, N. Y.
Buckeye Dryer Co., Chicago, Ill.
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Kennedy-Van Saun Mfg. & Engineering Corp., New York, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

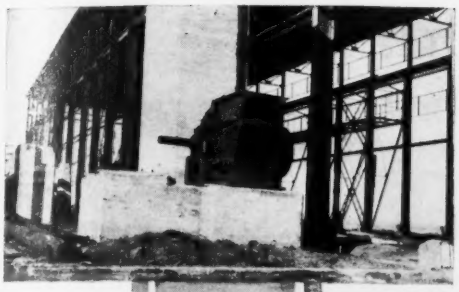
Dynamite
E. I. du Pont de Nemours & Co., Wilmington, Del.

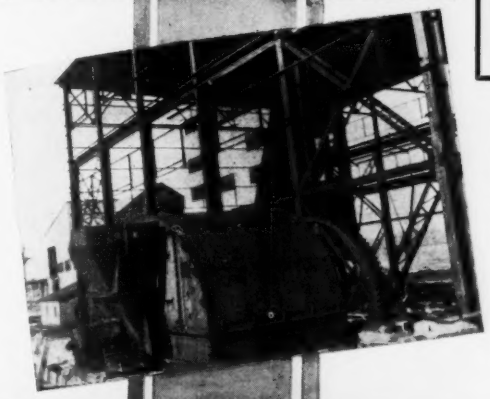
Engineers
Acme Road Machinery Co., Frankfort, N. Y.
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Robt. W. Hunt Co., Chicago, Ill.
Kritzer Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
F. L. Smidth & Co., New York, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

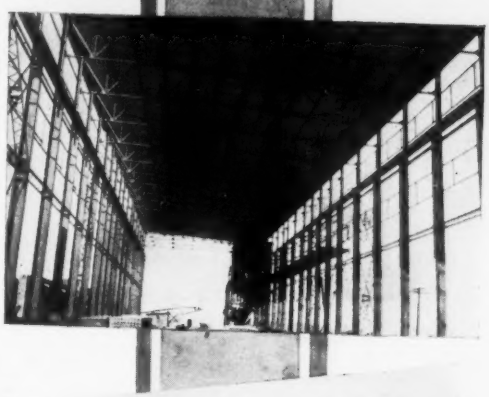
Engines (Gasoline, Kerosene and Oil)
American Hoist & Derrick Co., St. Paul, Minn.
Climax Engineering Co., Clinton, Iowa.
Clyde Iron Works Sales Co., Duluth, Minn.
Worthington Pump & Mchy. Corp., New York

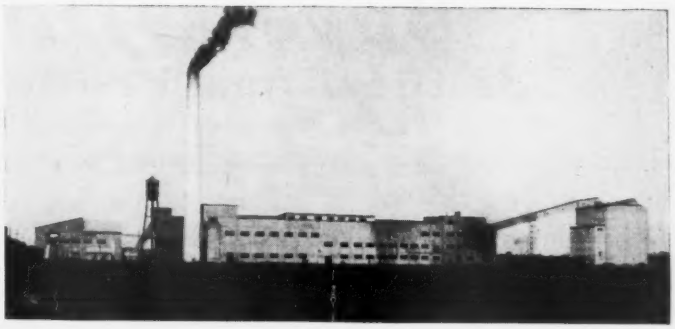
Engines (Steam)
American Hoist & Derrick Co., St. Paul, Minn.
Ellicott Machine Corp., Baltimore, Md.
Jackson & Church Co., Saginaw, Mich.
Morris Machine Works, Baldwinsville, N. Y.

Explosives (See Blasting Powder and Dynamite)









Steel and Fabricating

By the

Pittsburgh-Des Moines Steel Co.

The plant of the Pyramid Portland Cement Company at Valley Junction, near Des Moines, Iowa, is a real Des Moines plant.

The entire steel and fabricating work on this plant was done by the Pittsburgh-Des Moines Steel Co.

Fabricators and erectors of all kinds of structural steel and steel plate work, including all types of tanks—elevated tanks, standpipes, horizontal and vertical storage tanks, large tanks for storage of oil and other liquids. Consult with our engineers. We will be glad to quote on your work without obligation on your part.

Pittsburgh-Des Moines Steel Co.

854 Curry Bldg., Pittsburgh, Pa.
954 Tuttle St., Des Moines, Ia.

Chicago Detroit San Francisco New York Chatham, Ont. Denver Richmond Montreal, Que. Dallas

Plants: Des Moines, Ia.; Neville Island (Pittsburgh) Pa.; Chatham, Ont.

PITTSBURGH DES MOINES

Buyers' Directory
of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

Frogs and Switches
Central Frog & Switch Co., Cincinnati, Ohio
Koppel Ind. Car & Equipment Co., Koppel, Pa.

Fuses (Detonating and Safety)
E. I. du Pont de Nemours & Co., Wilmington, Del.
Ensign-Bickford Co., Simsbury, Conn.

Gas Producers
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Morgan Construction Co., Worcester, Mass.

Gears (Spur, Helical, Worm)
The Falk Corp., Milwaukee, Wis. (Helical)

Grease
Keystone Lubricating Co., Philadelphia, Pa.

Grizzlies
Austin-Western Road Machinery Co., Chicago, Ill.
Robins Conveying Belt Co., New York City
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.

Gypsum Plaster Plants
J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kans.

Hoists
American Hoist & Derrick Co., St. Paul, Minn.
Clyde Iron Works Sales Co., Duluth, Minn.
Hyman-Michaels Co., Chicago, Ill.
Industrial Works, Bay City, Mich.
Jackson & Church Co., Saginaw, Mich.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

Hose (Water, Steam, Air Drill)
New York Belting & Packing Co., New York City

Hydrators (Lime)
Kritzer Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Insulation (Heat)
Celite Products Co., Chicago, Ill.

Kilns (Rotary)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Engineering Corp., New York City
H. Miscampbell, Duluth, Minn.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

Kilns (Shaft)
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Lime Handling Equipment
H. W. Caldwell & Son, Chicago, Ill.
Kritzer Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
H. Miscampbell, Duluth, Minn.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Sturtevant Mill Co., Boston, Mass.
Webster Mfg. Co., Chicago, Ill.

Lime Kilns
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.

Loaders and Unloaders
Jeffrey Mfg. Co., Columbus, Ohio
Link-Belt Co., Chicago, Ill.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Locomotives (Steam, Gas and Elec.)
Baldwin Loco. Wks., Phila., Pa. (Steam)
Fate-Root-Heath Co., Plymouth, Ohio (Gas)
Ironton Eng. Co., Ironton, Ohio (Elec.)
Jeffrey Mfg. Co., Columbus, Ohio (elec.)
Lima Locomotive Works, Lima, Ohio (Steam)
Milwaukee Loco. Mfg. Co., Milwaukee, Wis. (Gas)
H. K. Porter Co., Pittsburgh, Pa. (Steam)
Vulcan Iron Works, Wilkes-Barre, Pa. (Steam)

Lubricating Systems
Keystone Lubricating Co., Philadelphia, Pa.
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Magnetic Devices (Pulleys, etc.)
Dings Magnetic Separator Co., Milwaukee, Wis.

Manganese Steel (Castings, Repairs, etc.)
American Manganese Steel Co., Chicago Heights, Ill.
Hadfield-Penfield Steel Co., Bucyrus, Ohio

Mills, Grinding (Ball, Tube, etc.)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Jackson & Church Co., Saginaw, Mich.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
F. L. Smidth & Co., New York, N. Y.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Worthington Pump & Mchy. Corp., New York

Motors and Generators
Burke Electric Co., Erie, Pa.

Oil Burners and Systems
Smokeless Oil Burner Co., Bucyrus, Ohio

Packing (Pump Valves, etc.)
New York Belting & Packing Co., New York City

Perforated Metal
Cross Engineering Co., Carbondale, Pa.
Harrington & King Perforated Co., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
W. Toepfer & Sons Co., Milwaukee, Wis.

Pipe (Dredge, etc.)
American Rolling Mill Co., Middletown, Ohio

Portable Conveyors
Jeffrey Mfg. Co., Columbus, Ohio

Portable Engines
Climax Engineering Co., Clinton, Iowa

Power Units
Climax Engineering Co., Clinton, Iowa

Pulleys (Magnetic)
C. G. Buchanan Co., New York City
Magnetic Mfg. Co., Milwaukee, Wis.

Pulverizers
Fuller-Lehigh Co., Fullerton, Pa.
Jeffrey Mfg. Co., Columbus, Ohio
K-B Pulverizer Co., Inc., New York City
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Universal Crusher Co., Cedar Rapids, Iowa

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Manganese Steel Co., Chicago Heights, Ill.
Ellicott Machine Corp., Baltimore, Md.
Morris Machine Works, Baldwinsville, N. Y.

Pumps (Water, etc.)
Morris Machine Works, Baldwinsville, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Smokeless Oil Burner Co., Bucyrus, Ohio
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo.
Worthington Pump & Mchy. Corp., New York

Pump Valve (Rubber)
New York Belting & Packing Co., New York City

Rails
Koppel Ind. Car & Equipment Co., Koppel, Pa.

Railway Supplies
Atlas Railway Supply Co., Chicago, Ill.

Road Machinery
Acme Road Machinery Co., Frankfort, N. Y.
Austin-Western Road Machinery Co., Chicago, Ill.
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Marion Steam Shovel Co., Marion, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Universal Road Mchy. Co., Kingston, N. Y.

Roofing and Siding Material
American Rolling Mill Co., Middletown, Ohio

Scrapers (Drag, etc.)
Austin-Western Road Machinery Co., Chicago, Ill.
Northwest Engineering Co., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.

Screens
Acme Road Machinery Co., Frankfort, N. Y.
Austin-Western Road Machinery Co., Chicago, Ill.
Earle C. Bacon Co., New York, N. Y.
Cross Engineering Co., Carbondale, Pa.
Rubert M. Gay Co., Inc., New York, N. Y.
Harrington & King Perforating Co., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Kennedy-Van Saun Mfg. & Engineering Corp., New York City
Link-Belt Co., Chicago, Ill.
McLanahan Stone Mach. Co., Hollidaysburg, Pa.
Newark Wire Cloth Co., Newark, N. J.
Robins Conveying Belt Co., New York City
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.
W. S. Tyler Co., Cleveland, Ohio
United Iron Works, Inc., Kansas City, Mo.
Universal Crusher Co., Cedar Rapids, Iowa
Weller Mfg. Co., Chicago, Ill.

Screens (Electric Vibrating)
W. S. Tyler Co., Cleveland, Ohio

Separators (Magnetic)
C. G. Buchanan Co., New York City
Dings Magnetic Separator Co., Milwaukee, Wis.
Magnetic Mfg. Co., Milwaukee, Wis.

Shafting
H. W. Caldwell & Son, Chicago, Ill.

Shovels (Steam, Gas and Electric)
Browning Co., Cleveland, Ohio
Erie Steam Shovel Co., Erie, Pa.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Sprockets and Chain
American Manganese Steel Co., Chicago Heights, Ill.
H. W. Caldwell & Son Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, Ohio

Steel Plate Construction
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Hendrick Mfg. Co., Carbondale, Pa.
Jackson & Church Co., Saginaw, Mich.

Structural Steel Work
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.

Testing Sieves and Shakers
Newark Wire Cloth Co., Newark, N. J.
W. S. Tyler Co., Cleveland, Ohio

Tool Steel
Colonial Steel Co., Pittsburgh, Pa.

Track Equipment
Central Frog & Switch Co., Cincinnati, Ohio
Koppel Ind. Car & Equipment Co., Koppel, Pa.

Tramways (Aerial Wire Rope)
Interstate Equipment Corp., New York City
A. Leschen & Sons Rope Co., St. Louis, Mo.

Transmission Machinery
H. W. Caldwell & Son Co., Chicago, Ill.
Kritzer Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Underground Loaders
Thew Shovel Co., Lorain, Ohio

Valves (Throttle)
Knox Mfg. Co., Philadelphia, Pa.

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Link-Belt Co., Chicago, Ill.
McLanahan Stone Mach. Co., Hollidaysburg, Pa
Smith Engineering Works, Milwaukee, Wis.

Weighing Equipment
Merrick Scale Co., Passaic, N. J.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Welding Equipment
Burke Electric Co., Erie, Pa.

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Koppel Ind. Car & Equipment Co., Koppel, Pa.

Wire Cloth
Newark Wire Cloth Co., Newark, N. J.
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Wire Rope
A. Leschen & Sons Co., St. Louis, Mo.

PERFORATED STEEL SCREENS

You can always get a better understanding of the advantages of Cross Perforated Steel Screen if you will talk to users.

There are hundreds and hundreds of them and the service they enjoy is uniformly excellent.

500 tons or more of steel plates and sheets are carried in stock. This enables us to fill rush orders promptly.

Repair and renewal parts supplied quickly and correctly.

Write for prices and information

Cross Engineering Company, Offices and Works, Carbondale, Pa.

Economical Haulage

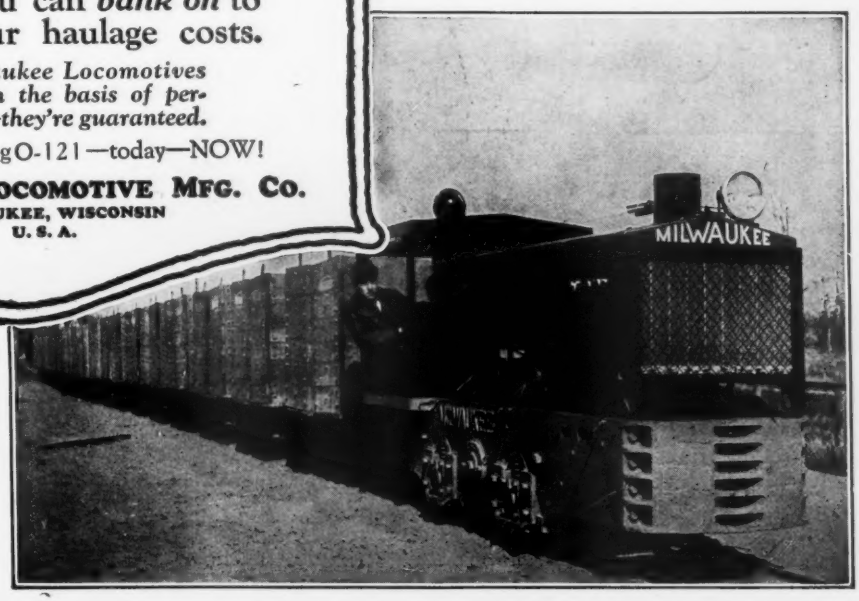
When you put a MILWAUKEE on the job you have the *satisfaction* of knowing that you have a real locomotive—one that you can *bank on* to reduce your haulage costs.

All Milwaukee Locomotives are sold on the basis of performance—they're guaranteed.

Write for Catalog O-121—today—NOW!

MILWAUKEE LOCOMOTIVE MFG. CO.
MILWAUKEE, WISCONSIN
U. S. A.

MILWAUKEE GASOLINE LOCOMOTIVES



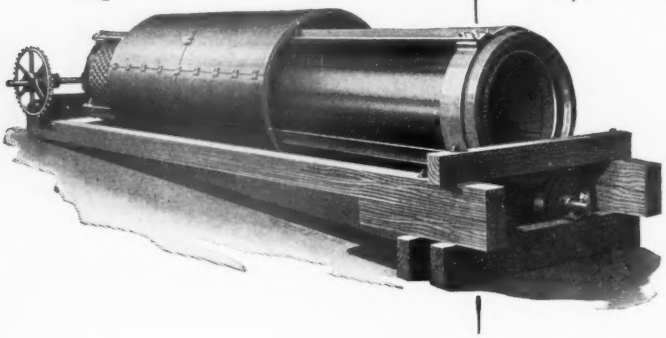
You'll never know how much real value can be built into a locomotive until you learn more about the "Milwaukee."

TELSMITH WASHING SCREENS

Don't take a chance on the quality of your gravel! Wash it! And, while you're about it, don't just wet it; but SCRUB it thoroughly. The first section of the Telsmith Washing Screen is a ***scrubber,*** equipped with lifting angles and retarding blades that churn up, lift and cascade the aggregate. At the same time, a 2-inch spray pipe plays upon the material and disintegrates the extraneous matter. Dirt can't resist this treatment long. It's soon washed out.

The Telsmith Heavy Duty Washing Screen is the most compact washing screen on the market. It discharges all its product at a point just a few inches lower than its feed. Frequently it saves its own price in the cost of your bins and conveyors. It is simple to drive, reliable in operation, economical of water and upkeep—just the equipment for the modern gravel pit. Glad to send you, without obligation, our bulletin No. GP-11.

Telsmith Heavy Duty Washing Screen, improved type, equipped with *steel* rollers, two-piece head-ring and renewable steel tracker ring.



SMITH ENGINEERING WORKS

3188 Locust St. Milwaukee, Wis.

Heavy Duty Moto-Vibro Screen

FOR SAND, GRAVEL, CRUSHED STONE, ETC.

Coarse or Fine 1 to 3 Products

WET, DRY, DAMP
(within reasonable limits)

ASTONISHING CAPACITIES

ACCURATE OUTPUTS

INEXPENSIVE

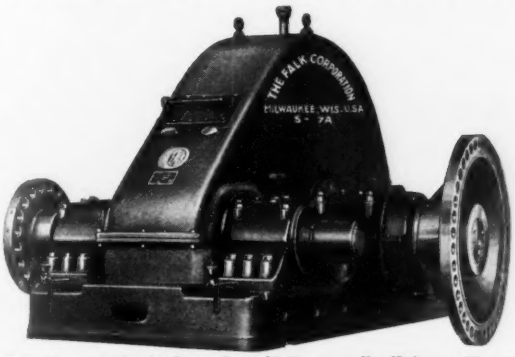
SCREEN FRAMES CHANGED IN 5 MINUTES—NO SPECIAL CLOTH

Intense vibration separates adhering sand from pebbles, breaks up sand "mats," prevents building on wire, wedging, and keeps meshes open.

Motor or belt driven, no auxiliaries. Simple, durable, accessible.

STURTEVANT MILL CO. HARRISON SQUARE **Boston, Mass.**

FALK
HERRINGBONE GEARS



Falk Type S Herringbone Gear Unit—overall efficiency 99 per cent when running at full speed under rated load. Gears enclosed for protection against abrasive dust.

Cost Price— and the Real Price

"Cost Price" is a term often improperly applied to "Purchase Price."

Costs, as an element in business, never cease. They must be figured day by day and year after year.

A piece of cheap equipment representing an initial saving that is afterwards eaten up by rapid depreciation, frequent repairs, wasted power, parts wracked by vibration, is the most *costly* piece of equipment in the long run.

The original price may be smaller, but a long time is required to finish paying for it.

In the power transmission field, Falk Herringbone Gears actually represent the lowest "cost" price.

Our engineering department can prove to your satisfaction that Falk Herringbone Gears are *most economical* on your grinding and pulverizing machinery.

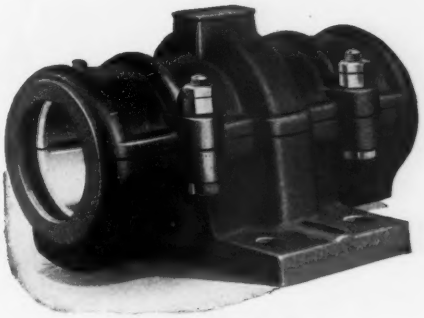
The Falk Corporation
MILWAUKEE, WISCONSIN

REPRESENTATIVES:

W. O. Beyer, 1007 Park Bldg., Pittsburgh, Pa.
M. P. Fillingham, 50 Church St., New York City.
General Machinery Co., Brown Marx Bldg., Birmingham, Ala.
Vulcan Iron Works, Wilkes-Barre, Pa.
Mine & Smelter Supply Co., Denver, Salt Lake and El Paso
Engineering Equipment Co., Ltd., 358 Beaver Hall Sq., Montreal, Quebec, Canada.

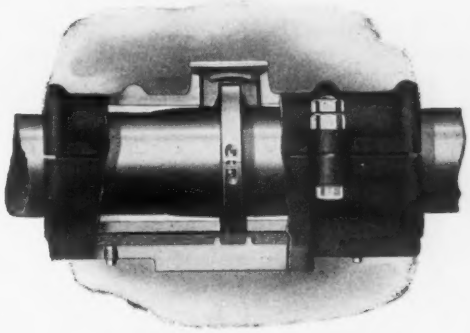
FOREIGN REPRESENTATIVES: Gustav Melms, 3 Rue Taitbout, Paris

Lubrication Is Positive Economical and Safe



Collar Oiling Flat Box

Reduce lubrication expense in your operation by using bearings of the type shown.



Sectional View of Collar Oiling Box

Building a complete line of reliable power transmission machinery, we offer the services of our engineers to help solve your transmission problems and request the opportunity to quote on your requirements. With our splendid facilities there is no inquiry too small for our careful attention nor too large for us to handle.

ALLIS-CHALMERS
MANUFACTURING COMPANY

ELECTRICAL MACHINERY
STEAM TURBINES — STEAM ENGINES
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PUMPING ENGINES
CENTRIFUGAL PUMPS
CONDENSERS
AIR COMPRESSORS — AIR BRAKES
STEAM AND ELECTRIC HOISTS
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POWER TRANSMISSION MACHINERY

MILWAUKEE, WISCONSIN, U.S.A.

The multi-cylinder, all wheel drive Shay gives years of low-cost, satisfactory service

"We Are Well Satisfied With Shays"

"We have been using Shay Geared Locomotives for quarry work at our quarries for a number of years and are very well satisfied with the results we have had."

Years of continuous, satisfactory service from a quarry locomotive are possible only in a rugged, carefully designed engine.

We would like to explain the details and refinements of construction in Shay Geared Locomotives, which make them ideally suited for your requirements.

LIMA LOCOMOTIVE WORKS, Incorporated
17 East 42nd St., New York Lima, Ohio

VULCAN

Locomotives

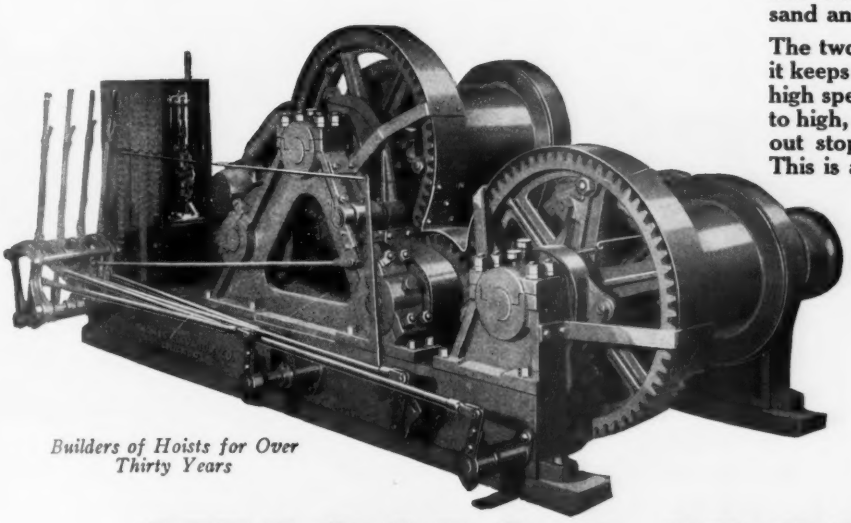
This 10x16 in. 19 ton, 36-in. gauge locomotive, with link and pin couples and steam brake is now on the job at the plant operated by G. W. Johnston Limestone Co., Hillsville, Lawrence Co., Pa.

The Vulcan stands out sharply as an example of a superfine product in which the benefits and economies of large productions have been awarded the buyers.

Producers of non-metallic minerals to whom nothing but the best is acceptable, and who are keen for value, will naturally turn to the Vulcan.

VULCAN IRON WORKS
Est. 1849
1753 Main Street Wilkes-Barre, Pa.
New York 50 Church St.
Chicago McCormick Bldg.

Specialized Hoists for Sand and Gravel



Builders of Hoists for Over Thirty Years

The Thomas Two-Speed Electric Slack-line Cableway Hoist is an ideal hoist for sand and gravel.

The two speed device is so designed that it keeps pulling in the slow speed until the high speed takes effect; the shift from low to high, and vice-versa, can be made without stopping the rotation of the drums. This is an exclusive Thomas feature.

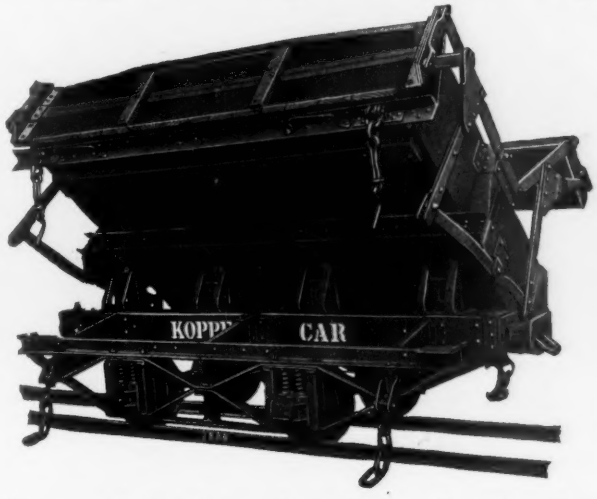
Ask for Bulletin No. 33

Thomas Elevator Company
27 South Hoyne Avenue
Chicago

THOMAS HOISTS

TRADE MARK REGISTERED
KOPPEL
U.S. PATENT OFFICE

Koppel Hinged Type Square Box Dump Cars



For Quarry Service and Steam Shovel Loading

The large door opening—the substantial door construction—the pressed steel diaphragms in the underframe—the double spring suspended bearings are some of the features which make these cars operate easily, ride the tracks smoothly and stand up under the strain of steam shovel service.

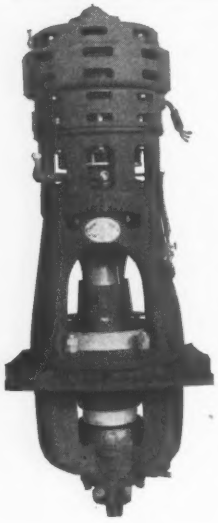
Write for our bulletins

Koppel Industrial Car & Equipment Company, Koppel, Pa.

Sales Offices:

New York Pittsburgh Chicago Detroit Kansas City Philadelphia San Francisco

The Weston Direct Drive Gyratory Crusher for Secondary Reduction of Hard Rock, Ore and Gravel



Developed in a Granite Crushing Plant

This machine fills the need for a secondary crusher of large capacity and great strength for work in all friable rock.

The first machine, installed more than two years ago, has established remarkable records for capacity, low power consumption and general economy in operation. Later installations have more than proved all claims for the machine.

The construction is all-steel with Chrome-Vanadium forged steel shaft of large size, and with full-bearing eccentric, bronze bushed inside and out.

The entire machine is arranged to give freedom from costly delays. Positive lubrication without pumps—Dust prevention in bearings—Greater wear on manganese before replacement—Ease of adjustment and repair—and a sturdy oversize motor—All work to your advantage.

Crusher is simple in design and the best practice in modern Engineering is utilized. Built in six standard sizes to follow any primary, smallest machine can be set to ½" with large capacity.

Arranged for direct motor, or belt drive.

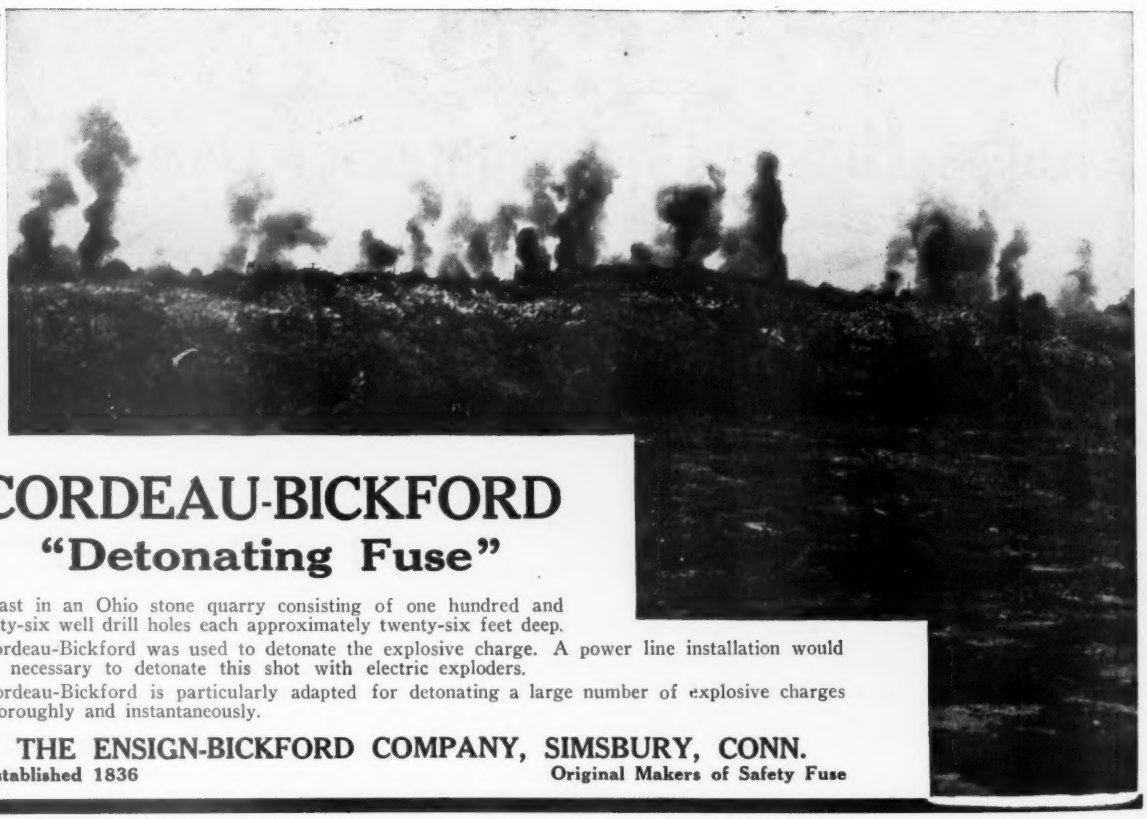
Bulletin No. 25-A describes this machine in detail

THE MORGAN ENGINEERING COMPANY
ALLIANCE, OHIO

Chicago
122 S. Michigan Ave.

Designers, Manufacturers and Contractors
Electric Traveling Cranes, Rolling Mill Machinery
Ordnance, Steel, Shipbuilding and Forging Plants Complete
Rock Crushers, Special Machinery for Any Purpose

Pittsburgh
1420 Oliver Bldg.
Birmingham, Ala.
Brown-Marx Bldg.



CORDEAU-BICKFORD
"Detonating Fuse"

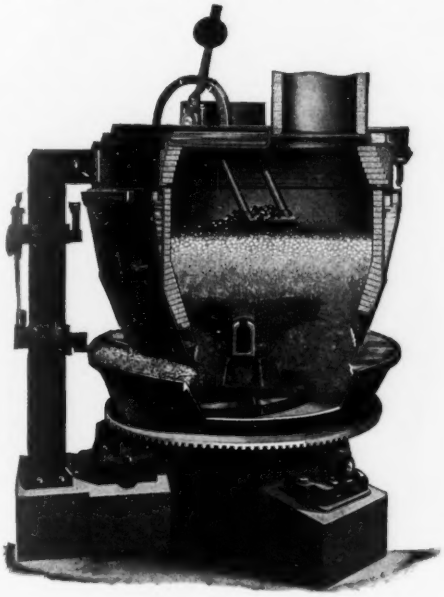
Blast in an Ohio stone quarry consisting of one hundred and fifty-six well drill holes each approximately twenty-six feet deep. Cordeau-Bickford was used to detonate the explosive charge. A power line installation would be necessary to detonate this shot with electric exploders.

Cordeau-Bickford is particularly adapted for detonating a large number of explosive charges thoroughly and instantaneously.

THE ENSIGN-BICKFORD COMPANY, SIMSBURY, CONN.

Established 1836 **Original Makers of Safety Fuse**

The Machine of Absolute Satisfaction



Selected by every large purchaser in the steel industry since the armistice. Three recent installations at leading Eastern Lime Plants.

POKERLESS PRODUCER-GAS MACHINE

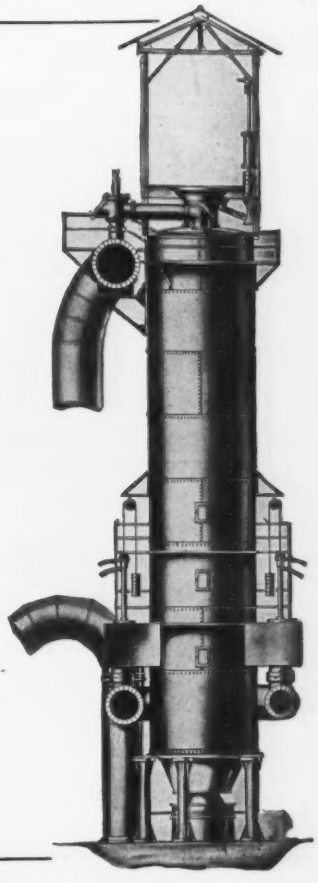
Users everywhere testify with one voice to the superior satisfaction and low maintenance expense of this splendid machine. Difference in first cost comes back annually; every detail built for endurance.

MORGAN CONSTRUCTION CO.
Worcester, Mass.
W. D. Mount, 601 Peoples National Bank Bldg., Lynchburg, Va., Representative in the Lime Industry

Continuous Discharge—Gas Fired
LIME KILNS

The wastefulness of efficiency of any lime burning apparatus is determined by the amount of fuel per ton of lime produced.

Our Kilns are not an experiment, but have successfully met the test of years of actual service. The design is the work of our Consulting Mechanical and Chemical Engineer, who has had many years of practical operative experience. They embody a number of labor saving devices, and are designed to secure maximum production with minimum fuel consumption; their record in this respect should interest every lime producer in the country.



Glamorgan Pipe & Foundry Company
Lynchburg, Va., U. S. A.
Using the Nationally Famous Virginia Foundry Irons

WELLER-MADE EQUIPMENT

For Handling the Materials Mechanically

Increase the Output and Reduce Costs by Employing Weller-Made Machinery to Do the Work

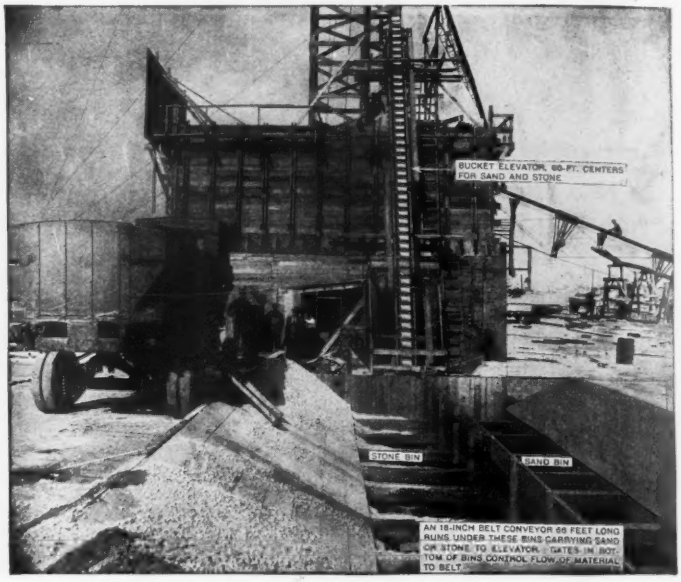
It is sturdy and reliable. Never lays down on the job. The cost of operation is small. Will help pay dividends.

We Make
Conveyors of All Types

Bucket Elevators	Portable Elevators
Steel Storage Bins	Bin Gates
Screens	Sheet Metalwork, etc.

WELLER MADE CHICAGO

Write and let us know the kind of equipment you are interested in or the material you want to handle. Catalogues showing installations, also data to help in selection of equipment, will be sent.


BUCKET ELEVATOR, 60-FT. CENTERS FOR SAND AND STONE
STONE BIN
SAND BIN
AN 18-INCH BELT CONVEYOR 68 FEET LONG RUNS UNDER THESE BINS CARRYING SAND OR STONE TO ELEVATOR. GATES IN BOTTOM OF BINS CONTROL FLOW OF MATERIAL TO BELT

WELLER MFG. CO.

1820-1856 North Kostner Avenue — SALES OFFICES — Chicago, Illinois

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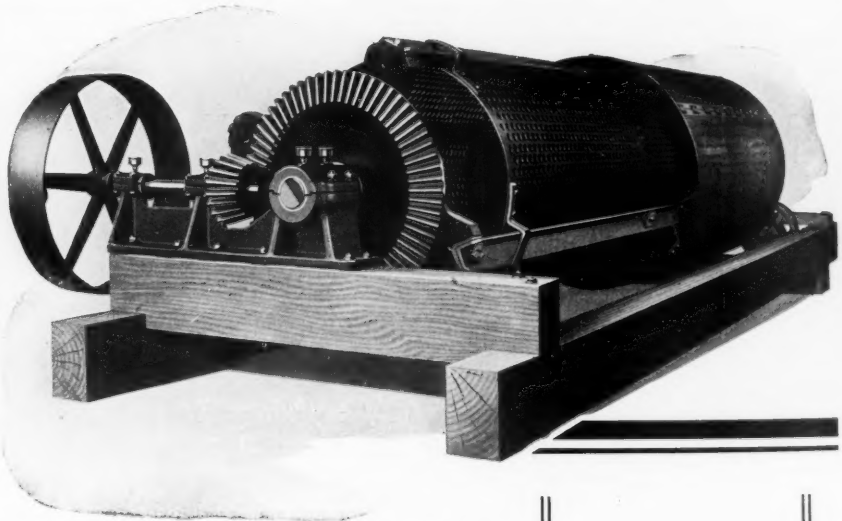
The TOEPFER SCREENS



Toepfer Screens are always built with the highest grade of materials, assuring durability and a continuous service performance that develops an unusual degree of operating economy.

They are heavy screens, made in several sizes. The head ring at the receiving end is cast steel, running on chilled rollers. The gear head and main bearing are cast in one piece.

Send for our Catalog

W. Toepfer & Sons Co., Milwaukee, Wisconsin

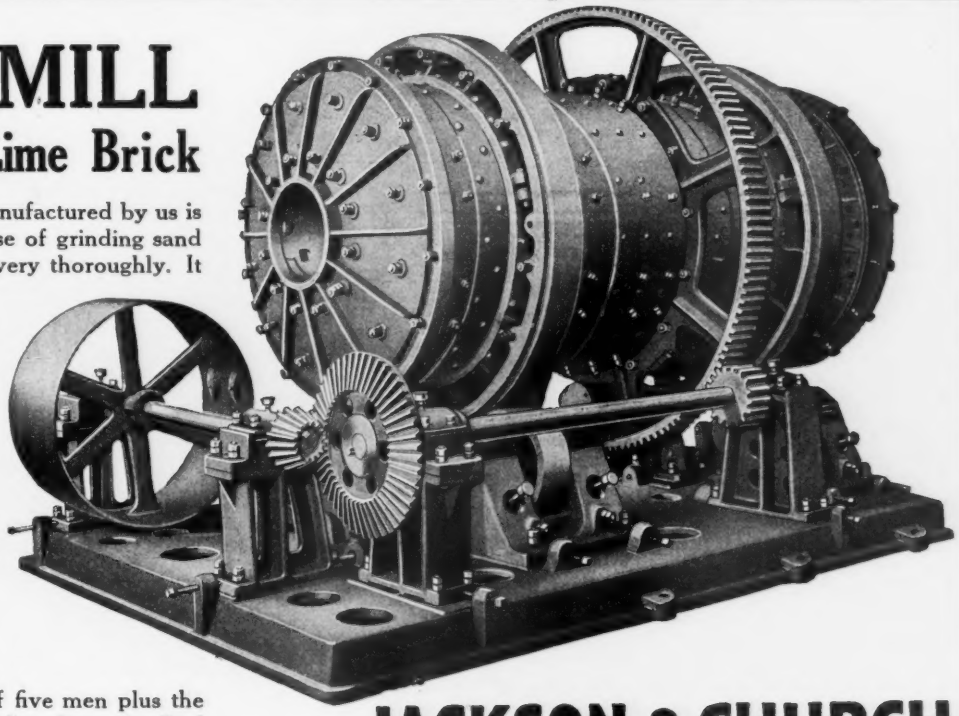
We Also Manufacture:

Elevators, Sand Washers, Washing Screens, Grizzlys, Feeders, Conveyors, Bin Gates, Perforated Metals.

ROD MILL
for Sand-Lime Brick

The Rod Mill as manufactured by us is made for the purpose of grinding sand and hydrated lime very thoroughly. It has been tested out and all tests show a more thorough mix than any other method could produce.

This Rod Mill is used in conjunction with the Church Volumeter. The work is all done mechanically, and only takes one man for operating, making a saving of labor of five men plus the better mix and grinding from the Rod Mill and plus the exact proportioning of Volumeters.



JACKSON & CHURCH Company
SAND LIME BRICK MACHINERY
SAGINAW, MICH. U. S. A.

GEARS

SMOOTH running; correct in design, accurate and true to pitch, Caldwell gears are bound to please you. We make all types—machine-molded, cut tooth, mortise gears, worm gears, etc. Learn more about Caldwell-Link-Belt Service.

Let us figure with you next time you are in the market.

H. W. CALDWELL & SON CO. LINK-BELT COMPANY, OWNER
Dallas, Texas, 709 Main Street—Chicago, 17th Street and Western Ave.—New York, Woolworth Bldg.

CALDWELL

MANGANESE
THE FIRST ERA STILL LEADS IN QUALITY
STEEL
THE HADFIELD-PENFIELD STEEL COMPANY
BUCYRUS, OHIO

Defying Time—

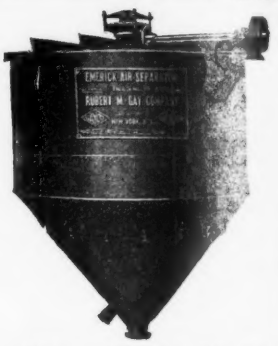
Era Repair Parts are made of time defying Manganese Steel, the steel that reduces wear to a minimum and practically eliminates shutdowns caused by broken parts.

Let us quote your requirements.

The Hadfield-Penfield Steel Co.
Bucyrus, Ohio

GAYCO

CENTRIFUGAL SEPARATOR



60 mesh to 350 mesh

A Dependable "AIR-SCREEN" for sizing

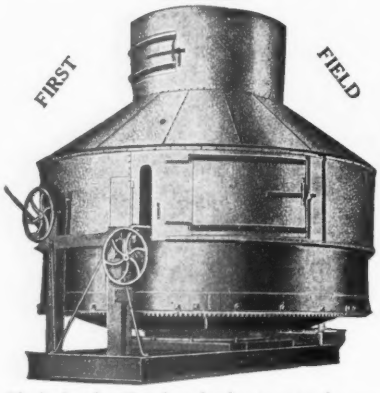
Fibrous, Flaky or Granular Materials

Write Us for Particulars

RUBERT M. GAY COMPANY, Inc. 114 Liberty St., New York, N. Y.

THE CLYDE LIME HYDRATOR

IN THE FIRST FIELD



The Clyde leads all other hydrators in the production of lime at about three-fifths the cost.

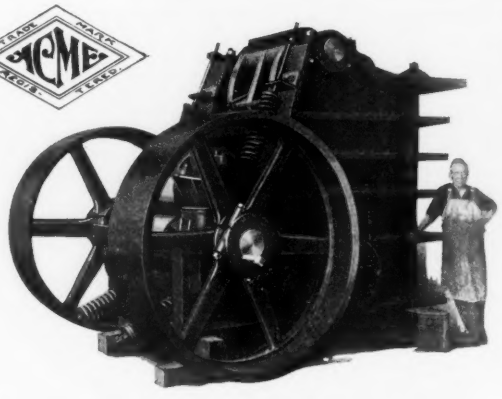
It is the choice of most lime operators not only because of low operating costs but because it is simple, easiest to operate and most economical in cost of installation and maintenance.

Patented Nov. 29, 1921—Serial No. 1398238

H. MISCAMPBELL

Patentee and Sole Manufacturer

DULUTH - - MINNESOTA



Acme Steel Crushers

6x10 to 42x48

We have in stock for immediate delivery sizes up to 30x36, one piece frame, and up to 26x40, four piece frame.

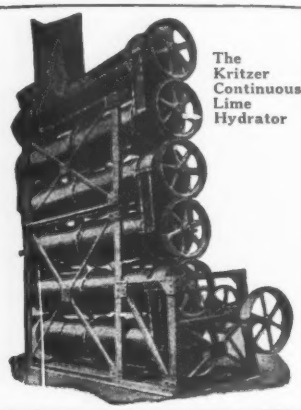
Diecast Genuine Removable Bearings

Complete Quarry Equipment
Write for Catalogue 12-B

Acme Road Machinery Company

Main Office and Factory

Frankfort, N. Y., U. S. A.



The Kritzer Continuous Lime Hydrator

HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

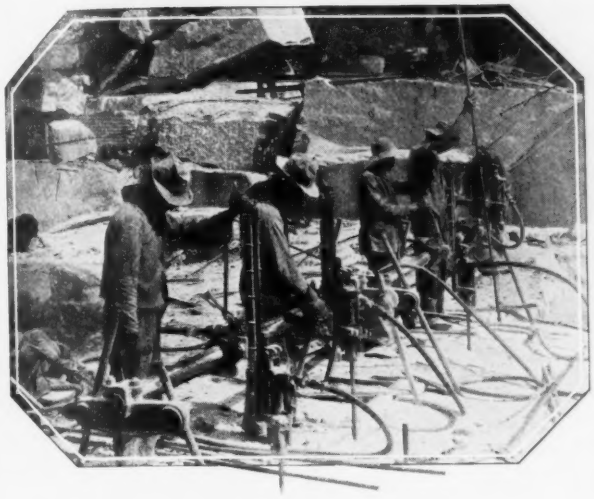
THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

THE KRITZER COMPANY

503 South Jefferson Street CHICAGO, ILL.

VANADIUM
RED STAR
DRILL STEEL



Faster Drilling, Lower Cost

THE toughness inherent in Vanadium Drill Steel is a vital factor in lowering costs in the quarry. Authentic records from many sources show that Red Star Vanadium not only cuts faster, but also holds its edge longer.

The toughness of the steel reduces drill bit breakage—an advantage further aided by the long lasting keen edge.

Red Star Vanadium durability is a means to most practical economy. Its speed in its work is a means to greater production at less cost. Right in your own work put Red Star Vanadium Drill Steel to any test. The way it produces day after day will prove its high worth to you.

In Stock at Our Warehouses

Colonial Steel Company

Pittsburgh
New Haven
Boston
New York

Cleveland
Cincinnati
Detroit
Chicago
St. Louis

Denver
Salt Lake City
Wallace, Idaho
Phoenix

Edw. L. Soule Co., San Francisco

Strong—Compact

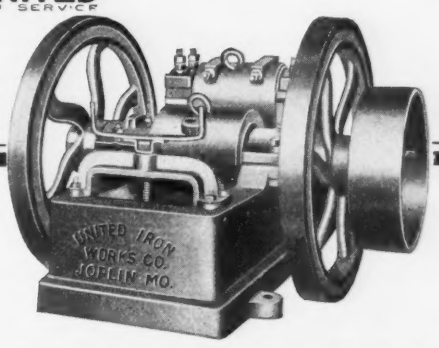
We would like to explain in detail why the "United" Blake Type Crusher excels.

We would like to tell you why it is impossible for eccentric and bumper shaft bearings to get out of line, and how easy it is to replace worn parts.

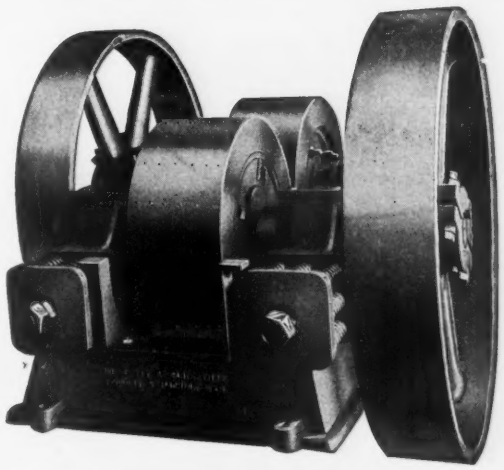
Before you place an order for a jaw crusher, let us tell you all about the "United."

Eight sizes. Openings from 7x10 in. to 12x24 in. Capacities from 6 to 35 tons per hour.

"UNITED" IRON WORKS INC. FOR SERVICE



UNITED IRON WORKS, Inc.
General Offices: Kansas City, Mo., U. S. A.



CRUSHERS—

Webb City & Carterville crushers, screens, elevator buckets, or transmission equipment have conspicuously demonstrated their superiority wherever they have been installed.

Write for Descriptive Circular

WEBB CITY & CARTERVILLE FOUNDRY & MACHINE WORKS
WEBB CITY, MISSOURI

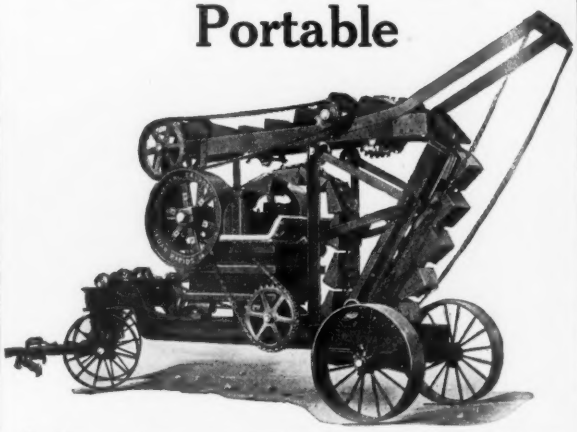
A Clamshell Crane Crossed with a Mountain Goat

That just about describes the qualifications of the "AMERICAN" Ten Ton cranes used by the Lock Joint Pipe Co., for handling concrete aggregate and trench excavation with a ¾-yard clamshell bucket. One of these cranes went down and up the 20 per cent banks of a creek without the least trouble.

The "AMERICAN" Ten Ton Crane on Continuous Chain Treads will travel all over the lot quickly and slickly without a track or a single pit man. Big savings are bound to result from its use.

AMERICAN
HOIST & DERRICK CO.
Saint Paul, Minn.
New York - Chicago - Pittsburgh - Seattle - New Orleans - Detroit

Convenient, Practical, Portable



Besides meeting every requirement of PIT and QUARRY in the production of fine crushed stone and gravel

UNIVERSAL STEEL CRUSHERS

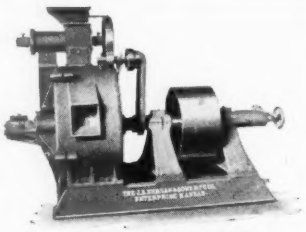
are the most convenient and practical large capacity machines on the market for use in portable outfits.

More than 20 sizes to choose from, either stationary or portable. Capacities 2 to 450 tons per day.

Write for information

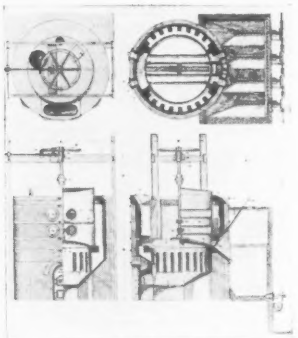
UNIVERSAL CRUSHER COMPANY
225 Third Street Cedar Rapids, Iowa

These fine grinding mills are made in two sizes. A 36-in. Vertical Mill arranged for belt or direct connected motor drive, and a 42-in. Horizontal Mill for belt drive. They are fitted with American, French Burr or Rock Emery Stone.



Vertical Grinding Mill

EHRSAM



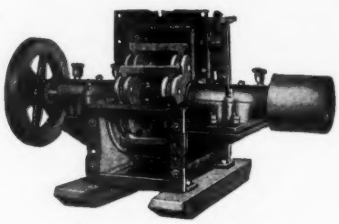
Calcining Kettles

Ehrsam Calcining Kettles are made in standard sizes: 4x4 ft., 5x5 ft., 6x6 ft., 8x8 ft., 10 x 8 ft., 12x8 ft., and 14x8 ft. They are complete with the exception of Brick Setting.

We also manufacture Hair and Fibre Pickers, Elevators and Conveying Machinery, Hammer and Revolving Screens, Power Transmission Machinery.

Inquiries Given Immediate Attention

The J. B. Ehrsam & Sons Mfg. Company
Enterprise, Kansas



Manganese Steel Linings

USERS OF

"K-B" PULVERIZERS

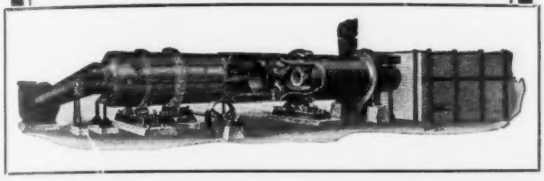
requiring additional tonnage are ordering "K-B" equipment.

May we tell you why?

K-B PULVERIZER

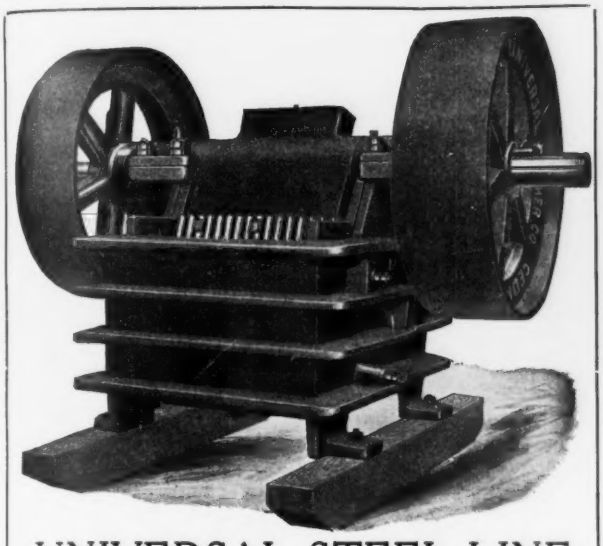
K-B Pulverizer Co., Inc.
92 Lafayette Street
New York

THE BUCKEYE DRYERS



This is the Buckeye Type B Dryer which the British Columbia Cement Co. are using for drying 12 tons of coal per hour at a fuel cost of 21 pounds of coal per ton of dried coal. Using no dust collectors. They say it is the best dryer they have ever seen for drying coal.

The BUCKEYE DRYER COMPANY
131 West Lake Street, Chicago, Ill.



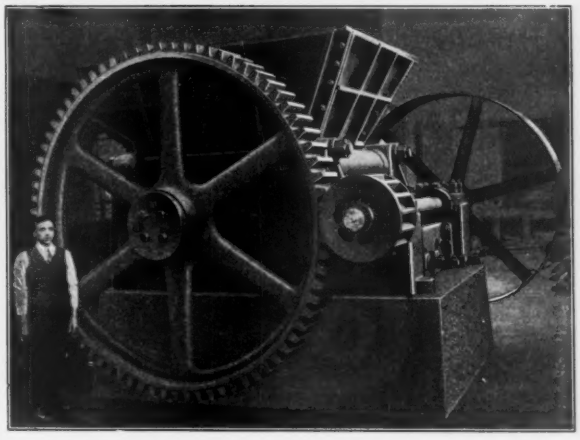
UNIVERSAL STEEL LINE

THE PERFECT GRAVEL AND REJECTION CRUSHER

Sizes up to 8"x36". Capacities 20 to 200 tons daily. Crushes to ¼" and finer if desired. Has no superior for FINE CRUSHING and UNIFORMITY of product.

STRONG LIGHT DURABLE ECONOMICAL

UNIVERSAL CRUSHER CO.
225 Third Street Cedar Rapids, Iowa, U. S. A.

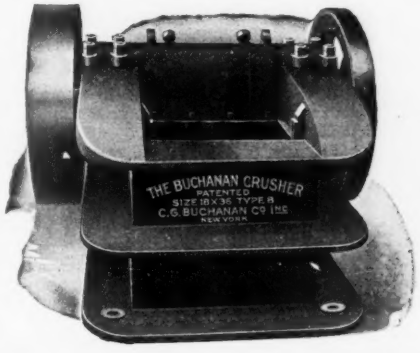


If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.
Hollidaysburg, Pa.
Screens, Elevators, Conveyors, Rock Washers, Etc.



BUCHANAN ALL-STEEL CRUSHER
Type "B" Jaw Crusher

Frame is a solid casting of open-hearth steel in one piece having a tensile strength of from 60,000 to 65,000 lb. per square inch, three or four times stronger than cast iron and with at least three or four times the rigidity of the built-up rolled steel-plate crusher.

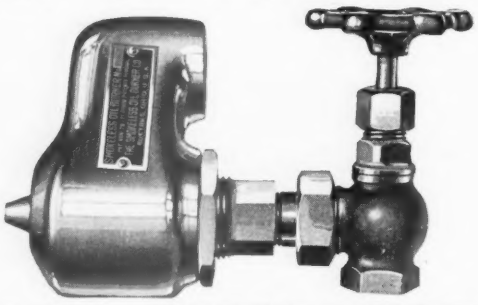
Jaw and Cheek Plates are of the best Manganese Steel, made reversible for double wear—Adjustable Jaw Stroke—Shim Adjustment—Safety Toggle—Reversible Steel Toggle Seats—Phosphor Bronze Frame Bearings (in smaller sizes)—Steel Swing Jaw and Pitman—Pitman water jacketed and parting in large sizes.

Built in sizes up to 18"x36".

Large Crushers, Crushing Rolls, Complete Crushing Plants
Write for Bulletin No. 9

C. G. BUCHANAN COMPANY, Inc.
Cedar and West Streets, New York City

The SMOKELESS



OIL BURNER

It is "smokeless" because it atomizes every drop of fuel, breaking it up into a perfect mist, thus assuring perfect combustion.

This device is readily installed at slight expense and is the ideal burner for boilers, dryers and all steam equipment where oil can be used as fuel.

Our engineering staff will investigate your proposition and make recommendations without favor.

The Smokeless Oil Burner Co.
Bucyrus, Ohio
St. Louis Office, 2140 Railway Exchange Building

AUGER DRILLS AUGER DRILLS

Heavy Duty Post Drills

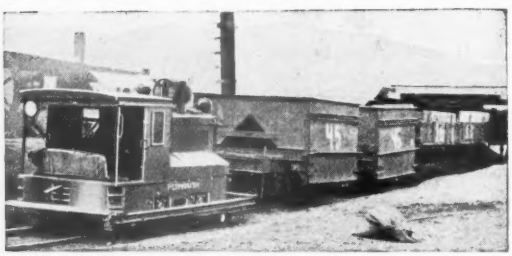
Bore Faster and Cheaper

Requires but a few seconds to adjust the Post and Howells Heavy Geared Post Drill is ready to bore Slate Shale, Gypsum, Fire Clay, etc. Geared to withstand the strength of two to four men.

Portable Electric Drills and Two Men Electric Drills arranged in various ways to suit your mining conditions. STEEL AUGERS made any size and any length required.

Howells Mining Drill Company
Established 1878 **Plymouth, Pa.**

Monolith Portland Cement Co. Endorse Plymouth Locomotives



The Monolith Portland Cement Co. of Los Angeles are big producers of Portland Cement. They write:

"We have two Plymouth Gasoline Locomotives in operation at our plant at Monolith, Calif. One is operating in the quarry, and one is hauling clay from the clay pits to the plant.

"These Locomotives have been in operation continuously for about a year. The repair cost has been very low. We consider them very sturdy and economical locomotives."

Write us about YOUR haulage problem and we will send you interesting literature.

The Fate-Root-Heath Co., Plymouth, Ohio

PLYMOUTH
Gasoline Locomotives

ROBINS 20-ft. Portable CONVEYOR $433.00

(Without Power)

F. O. B. Passaic, N. J.

This conveyor, with its troughed belt and absence of skirtboards makes it possible to handle sand, gravel, crushed stone, and other abrasive materials without damage to the edges of the belt.

Note these features:

16-in. Troughed Belt—large carrying capacity.
Self-cleaning Arched Frame—fully protecting the return belt from dirt accumulation.
Rugged Construction—well balanced. Capacity of one ton per minute.

If furnished with 2 H. P., A. C. Motor—$94 additional. With 5 H. P. "New-Way" Gasoline Engine—$175 additional.

Also built in 25, 30 and 35 ft. lengths.

Send for bulletin giving full specifications

ROBINS CONVEYING BELT CO.
PARK ROW BLDG., NEW YORK
Chicago Boston Pittsburgh

When writing advertisers please mention ROCK PRODUCTS

OSGOOD 12C—3-yd. on Traction Wheels

OSGOOD

Railroad Type Steam Shovels on Traction Wheels Eliminate

laying of tracks, use of pit crew and jack arms. Economical and easy to operate. No complicated wearing parts.

Ask for Bulletin 235

1½ to 6 yd. Railroad Type Steam Shovels.
¾, 1, 1¼-yd. Revolving Steam Shovels, Clamshells, Draglines and Cranes

The OSGOOD Company
MARION, OHIO, U. S. A.

POWER STEERING, from the cab, saves you a man's wages. Not necessary to have a man on the ground to throw clutches for steering.

CLIMBS GRADES as steep as 30% (engineer's measurement).

Buy a Caterpillar type shovel that is

UP-TO-DATE

If you have used any other caterpillar type steam shovel, you will see at once that the ERIE is far superior. It is automatically *lubricated*, from internal oil reservoirs. This greatly reduces friction—it gives you several times the climbing power. More than twice the speed of other caterpillar type shovels. It also assures you of steadier service and a much lower upkeep cost.

These features of the new 1922 ERIE, and many others, are interestingly described in our Bulletin P-60. *Write for a copy.*

The treads of the caterpiller type ERIE are all-steel, practically indestructible. No broken wooden fillers to replace, nor bent channels to repair. Every link pin is bushed, so that there is no wear on the link itself. Bushings when worn are easily replaced at slight expense.

ERIE STEAM SHOVEL CO., Erie, Pa., U. S. A.
Builders of Erie Steam Shovels and Locomotive Cranes

ERIE Revolving Shovels

For thirteen years this

Industrial Crane

Has been in use at the Lee Marble Works, Inc., Lee, Mass., and still operating satisfactorily in every way. For loading and unloading at the mill, for handling of block in storage, this INDUSTRIAL is much more efficient and permits spreading of materials to better advantage.

Our Golden Anniversary Catalog of INDUSTRIAL Cranes Sent Immediately on Request

Industrial Works, Bay City, Michigan
New York Chicago Philadelphia Detroit

SALES ENGINEERS IN ALL PRINCIPAL CITIES

1873 BUILDERS OF CRANES FOR 50 YEARS 1923

Oldest and Largest Manufacturers of Cranes in the Country
17 Different Types, Capacities 5 to 200 Tons

Flirting With the Shovels

In the game of crushed stone quarrying a drill that is within flirting distance with steam shovel or the loading gangs is in a dangerous position. A breakdown on the drill, and the whole production schedule is upset.

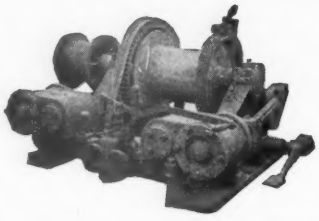
No. 14 Cyclone Drills, on the job, always keep plenty of stone ahead, and if they should ever be crowded there is no need for worry—the working parts are cast steel, reducing to the very minimum all possibility of breakdowns.

Write for "Big Blast Hole Drills," a semi-technical treatise on quarry drilling and also containing a complete description of Cyclone No. 14 Big Blast Hole Drills.

The Sanderson-Cyclone Drill Co.
Orrville, Ohio

Eastern and Export Office: 30 Church Street, New York City

FOR SALE



Emerson-Brantingham Hoists

UNUSED

DOUBLE CYLINDER, SINGLE DRUM, IN FIRST CLASS CONDITION

$125.00 Each F. O. B. Chicago

Capacity, 10,000 Pounds—IMMEDIATE SHIPMENT

Detailed Specifications Furnished on Application

"QUANTITY IS LIMITED"

Relaying Rails and Angle Bars

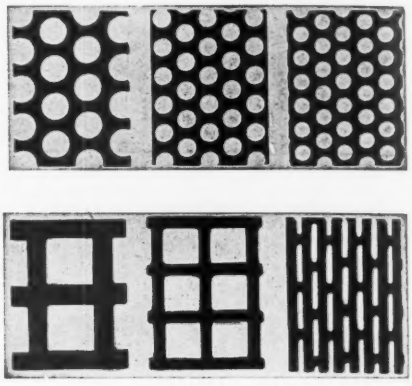
All Weights and Tonnages for Prompt Shipment

Get Our Quotations

HYMAN-MICHAELS CO.

531 Peoples Gas Bldg., Chicago, Ill.

Perforated Steel Screens



For Screening Stone, Gravel, Sand and Cement

All sizes and shapes of holes in metal of proper thicknesses to give the best screening results.

Sheets furnished flat or rolled to shape for revolving screens.

THE HARRINGTON & KING PERFORATING CO.

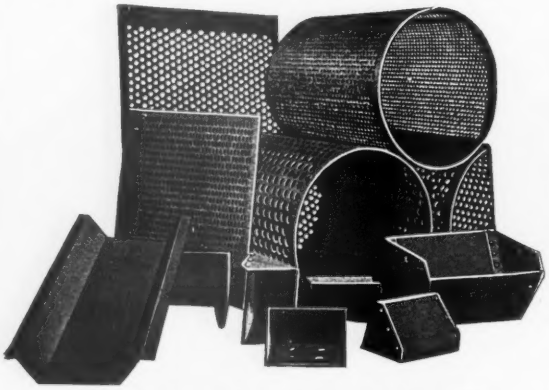
5650 Fillmore St., Chicago, Ill.

NEW YORK OFFICE: 114 Liberty St.

Perforated Metal Screens

FOR

Stone, Gravel, Sand, Etc.



ELEVATOR BUCKETS

PLAIN AND PERFORATED

General Sheet and Light Structural Work

"Light and Heavy Steel Plate Construction"

HENDRICK MFG. CO.

CARBONDALE, PA.

New York Office, 30 Church Street
Pittsburgh Office, 544 Union Trust Bldg.
Hazleton, Pennsylvania, Office, 705 Markle Bank Bldg.

NEWARK

"LOCK-CRIMP"

"NEWARK" Wire Cloth

This cloth is uniform in mesh, therefore producing a uniform product.

The quality of the wire is always the best, assuring the greatest economy.

Screens are made in all metals and in all meshes from 2-in. space to .0017-in. space.

Testing Sieves
U. S. S. Screen Scale

NEWARK WIRE CLOTH CO.

Newark, New Jersey

Fig. 283. Sand and Gravel Dredge

HYDRAULIC DREDGES
SAND and GRAVEL DREDGES
DREDGING PUMPS and MACHINERY

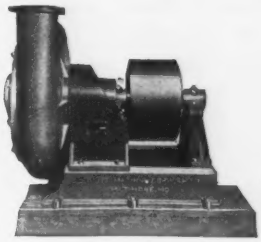


Fig. 280. Dredging Pump

Send for Bulletin 2094

Send for Bulletin 2084

Ellicott Machine Corporation, Baltimore, Maryland, U. S. A.

PENNSYLVANIA

The PENWAY PUMPER

The Portable Penway Pumper is a close-coupled, self-contained, low head, economical, gasoline-kerosene engine driven, centrifugal pumping unit that has more than proven its ability to perform.

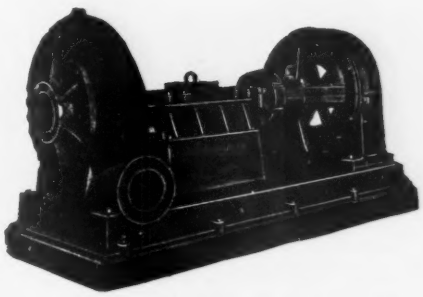
With this dependable machine on the job the operator enjoys a sense of security that practically eliminates all pumping worries. We will be glad to send you Bulletin No. 141 explaining in detail the many advantages to be gained in the use of this pump.

We also manufacture a full line of single stage and multi-stage centrifugal pumps and air compressors.

PENNSYLVANIA
PUMP AND COMPRESSOR COMPANY

MAIN OFFICES AND WORKS EASTON, PA.

BRANCH OFFICES:
325 Penfield Building, Philadelphia, Pa.
30 Church Street, New York City
105 West Monroe Street, Chicago, Ill.



Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4 in. up, arranged for belt, motor, or engine drive.

MORRIS MACHINE WORKS

50 Genesee St. Baldwinsville, N. Y.

39 Cortlandt St., New York City
Forrest Bldg., Philadelphia, Pa.
217 N. Jefferson St., Chicago, Ill.
Penobscot Bldg., Detroit, Mich.

Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

MORRIS

Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines

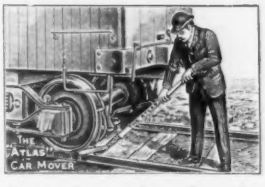
KNOX

Valves-Couplings-Nipples-Clamps-Menders

FOR HIGH PRESSURE AIR AND STEAM SERVICE

The Knox Mfg. Co., 821 Cherry St., Philadelphia

ATLAS CAR MOVER



State what style rail to be used on. We will then know what style to send you.

The Atlas Car Mover will move a car farther at a stroke and with less effort than any other car mover on the market.

They save time and money. You cannot afford to be without a few.

Write for Prices Today

ATLAS RAILWAY SUPPLY CO.

431 South Dearborn Street Chicago, Ill.

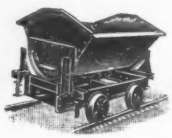
BYERS
Auto-Crane

Its ability to do effective work in limited quarters is just one of its recommendations. Furnished with mounting and power to suit purchaser. Takes all standard attachments.

Write for illustrated bulletin.

The Byers Machine Co.
310 Sycamore St., Ravenna, O.
Also builders of Full-Circle Cranes, Truckranes, Buckets, Hoists etc.

Chicago Office: Railway Exchange Bldg. New York: 30 Church St.



Industrial Cars
and
Dumping Buckets
of All Kinds

Specialize in

Hoppers, Bins, Bin Gates, Chutes

Penn Foundry & Manufacturing Company
Hillcrest, Reading, Pa.

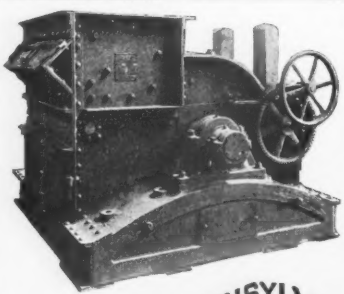
THE STANDARD OF EXCELLENCE

BALDWIN
Industrial and Contractors' LOCOMOTIVES

are in use where dependable motive power is required.

Full information upon request

The Baldwin Locomotive Works
PHILADELPHIA



"PENNSYLVANIA" CRUSHERS
for Limestone, Cement Rock, Shale, Lime, etc.

(a) Steel Frame Construction.
(b) Over-size Bearings.
(c) Tramp Iron Separator.
(d) Quick-acting Cage Adjustment.
(e) Steel Wear Liners.

Also Single Roll Crushers and Bradford Coal Breakers.

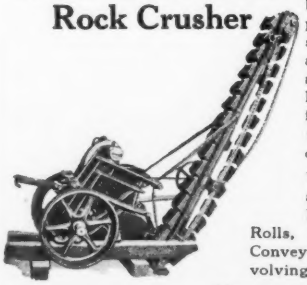
Put your Reduction Problems up to us.

Merchants Bank Bldg. Chicago

PENNSYLVANIA CRUSHER COMPANY

50 Church St. New York
Oliver Bldg. Pittsburgh
Stephen Girard Bldg., Philadelphia

New Holland
Rock Crusher



New Holland Rock Crushers will crush oversize from gravel banks or from larger crushing plants into finer grades, thus securing highest prices. They are durable and inexpensive and run on small power with little attention. Built in sizes from 2 to 15 tons per hour, requiring 5 to 15 h.p. to operate.

Write for descriptive catalog and prices on New Holland Rock Crushers, Recrushing Rolls, Rock Pulverizers, Elevators, Conveyors of various types and Revolving Screens.

Manufactured by
New Holland Machine Co., New Holland, Pa., U. S. A.

BACON~FARREL
ORE & ROCK
CRUSHING~WORLD KNOWN
ROLLS~CRUSHERS

EARLE C. BACON, INC. ENGINEERS
26 CORTLANDT ST., NEW YORK

"CARROLL" SOLID WELD

DEPENDABLE· ECONOMICAL·
Will Surely Reduce Operating Costs

THE CARROLL CHAIN COMPANY
COLUMBUS, OHIO

STEAM SHOVEL CHAIN

AJAX

BULL BEARING ALLOY

"Better than Babbitt"

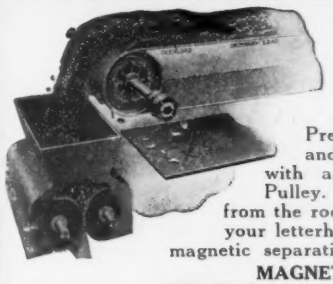
Ajax Bull Bearing Alloy in your crusher bearings prevents frequent re-babbitting and is a safeguard against costly breakdowns. We'll prove it.

Send for circular A and our offer.

The Ajax Metal Company, Philadelphia

Established 1880

New York Chicago Boston Cleveland



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MAGNETISM

Prevent crusher smash-ups and costly plant shut-downs with a High Duty Magnetic Pulley. It extracts scrap metal from the rock you crush. Write, on your letterhead, for free bulletin on magnetic separation in your industry.

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HIGH DUTY Magnetic Separators

Scientifically Designed Equipment

Zepp Automatic Hydrator
Meade Improved Lime Kilns
Complete Lime, Cement and Plaster Plants

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Chemical and Industrial Engineers

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Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

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Cement, Chemical and Physical Testing Laboratories

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2200 Insurance Exchange

New York St. Louis Kansas City Cincinnati Pittsburgh San Francisco

You or Your Competitor

Will be the first to obtain low and constant haulage costs.

Why not get the "bulge" on him by installing an

AUTOMATIC AERIAL TRAMWAY

Costs Nothing to Investigate

Write Us

INTERSTATE EQUIPMENT CORPORATION

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REPEAT orders indicate satisfied customers. That's why we are proud of the fact that a large percentage of our sales are to people who are already operating Sauerman Cableways. One large sand and gravel company has seven of our machines installed at their different plants. If you wish to know why our equipment is so popular, send for Pamphlet No. 17.

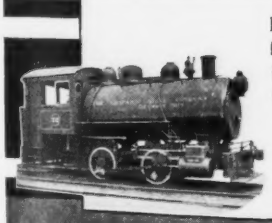
SAUERMAN BROS.

430 South Clinton Street Chicago

SAUERMAN DRAGLINE CABLEWAY EXCAVATORS

dig, convey, elevate and dump in one operation

PORTER



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H. K. PORTER COMPANY

Union Bank Bldg.
Pittsburgh, Penna.

LOCOMOTIVES

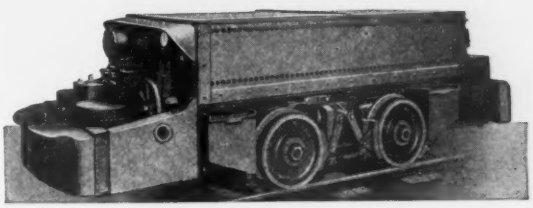
THE IRONTON

STORAGE BATTERY LOCOMOTIVE

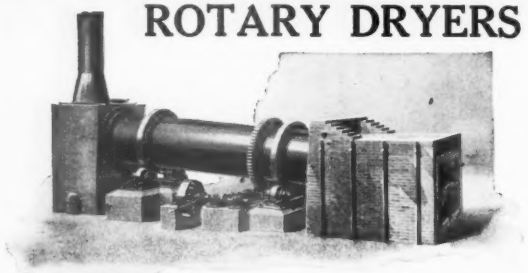
Efficient, economical hauling. Find out about storage battery locomotives for your hauling. The Ironton is the best storage battery locomotive.

The Ironton Engine Co.

Ironton, Ohio



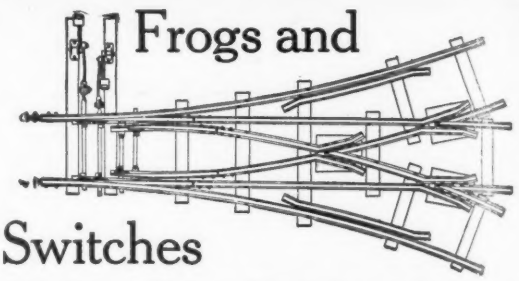
ROTARY DRYERS



Our Rotary Dryers covering a wide range in size and capacity, will successfully solve your drying problems.
The quality is standard, and as an investment they cannot be beaten.

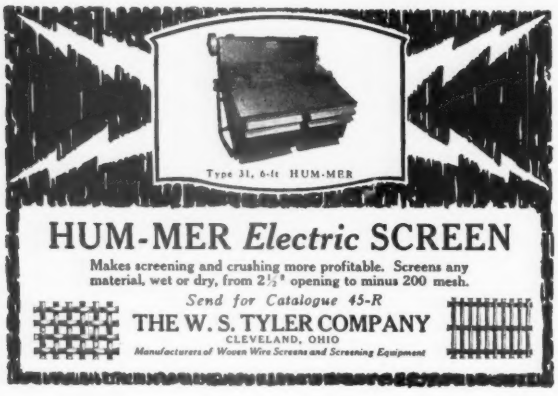
The Hadfield-Penfield Steel Co., Bucyrus, Ohio

Frogs and Switches



The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fish Plates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.



HUM-MER *Electric* SCREEN

Makes screening and crushing more profitable. Screens any material, wet or dry, from 2½" opening to minus 200 mesh.

Send for Catalogue 45-R

THE W. S. TYLER COMPANY
CLEVELAND, OHIO
Manufacturers of Woven Wire Screens and Screening Equipment

FULLER PRODUCTS

Insure Fullest Satisfaction

Crushing Rolls.
Pulverizer Mills.
Direct and Indirect Fired Dryers.
Ball and Tube Mill Liners and Partition Plates.
Fuller-Kinyon System for Conveying Pulverized Materials.
Sprockets, Traction Wheels, and Roll Heads.
All kinds of High Grade Chilled Charcoal Iron Castings for All Uses.

Ask for catalogue and prices

FULLER-LEHIGH COMPANY
Fullerton, Pa., U. S. A.

Electric Motors and Generators

for all requirements of the Rock Products Industry

BURKE ELECTRIC CO.
Main Office and Works
Erie, Penna.

Service Sales Offices

Buffalo, New York — Cleveland, Philadelphia — Detroit, Pittsburgh

Sales Agencies
Underwood Electric Co., Cincinnati
W. T. Osborn, Kansas City
Coast Equipment Company, San Francisco, Calif.

Weigh While in Transit Over

THE MERRICK CONVEYOR WEIGHTOMETER

An Automatic—Continuous—Accurate Record

Any material which is conveyor-handled can be weighed without additional handling or loss of time by the Merrick Conveyor Weightometer.
Scales guaranteed and proven better than 99% accurate.
Shipped as a complete unit. Fits any conveyor. Simple to install.

MERRICK SCALE MFG. COMPANY
Passaic, N. J.

CRESCENT BELT FASTENERS

They Insure Full Power Transmission

They Sustain the Belt's Full Strength

They Make Good Belts give Better Service

CRESCENT BELT FASTENER CO.
381 FOURTH AVE., NEW YORK.

When in the market for machinery or equipment, look through the advertisements of ROCK PRODUCTS. If you do not find what you want advertised in this issue, write us and we will put you in touch with reliable firms who can supply your need. This service is free to our readers. Use it.

Rock Products

The Nation's Business Magazine of the Rock Products Industry

542 So. Dearborn St. Chicago, Illinois

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

EQUIPMENT FOR SALE

BOILERS

300 H.P. Babcock and Wilcox
250 H.P. Sterling
3—66 in. x 16 ft. H. F. T.

ENGINES

24x48 in. Corliss
2—14x22 in. Side Crank
7x14 in. Side Crank

WATER HEATERS

Pittsburg 33 in. x 8 ft.
Webster 30 in. x 5 ft.
Stilwell Biench 30 in. x 5 ft.

PUMPS

Fairbanks-Morse Duplex 4½x3x4 in.
2—Worthington Duplex 10x12x18 in.
2—Worthington Duplex 6x6x4 in.

STEAM SHOVELS

1¼ cu. yd. Vulcan Railroad
2 cu. yd. Vulcan Railroad
1¼ cu. yd. Marion A, operated by 440 volt motor

DREDGE

2 cu. yd. Dipper Dredge Machinery, complete

SUCTION DREDGE PLANT, COMPLETE

12 in. American Manganese Pump, Swintek Cutter, Hoist Priming Pump, Discharge Pipe, Pontoons, Wooden Stiff Leg Derrick, 2 cu. yd. Hayward Bucket, 100 H.P. Electric Hoist, 30 H.P. Swinger
1 Dewatering Tank, ¼ ft., 40 ft. diameter, 19 ft. 10 in. high

HOISTS

Flory, 10x12 in., Two Drum
7x10, Two Drum

CRUSHERS

1—24 in. Symons
1—4 in. Allis-Chalmers Gyratory

LOCOMOTIVES

Brooks 70 ton Switcher, 20x24 in. cylinder, 3—55 in. Drivers

The Ohio Gravel Ballast Co.
Union Central Bldg. Cincinnati, Ohio

FOR SALE

One No. 10K Allis Chalmers Gyratory Crusher, Manganese fitted.....$7500
Three No. 6K McCully Gyratory Crushers, Manganese fitted, each.... 1750
One No. 5K Allis Chalmers Gyratory Crusher..... 1500
One No. 5 Austin Gyratory Crusher..... 1250
One 5x22' Power and Mining Tube Mill, steel lined..... 2500

EQUIPMENT SALES COMPANY
Nashville, Tenn.
"Wire us your requirements at our expense."
"If we don't have it we will get it."

FOR SALE

1—70 ton Steam Shovel
15—5 ton steel body, end dump, heavy duty standard gauge Quarry Cars.
1—No. 6K Gates Crusher
1—No. 4B Gates Crusher

All in good working order. Low prices to move quickly

INLAND CRUSHED STONE CO.
105 North Clark Street Chicago, Ill.

FOR SALE

5—Standard Keystone Lime Kilns, capacity 10 ton; practically new
1—No. 1 Williams swing hammer mill crusher—practically new
1—No. 3 new Williams swing hammer mill crusher, with automatic feeder; new, never used
12—All steel, end dump quarry cars, 42-in. gauge; 7 new, 5 slightly used
A number of steel hopper bins and supports
Priced to move quickly

Clinchfield Portland Cement Corp.
Kingsport, Tennessee

FOR SALE

Two 150 H.P. General Electric Induction Motors, voltage 440, 60 cycle, 3 phase, with starter, complete
Williams No. 9 Universal type pulverizer, complete
Williams No. 3 Hammer Mill, complete
Sturtevant No. 0 Rotary fine crusher
Jeffrey No. 2 limestone pulverizer on trucks with steel elevator

Address E. W. Cooper
174 Third Avenue, North
Nashville, Tenn.

SPECIAL BARGAINS

Send Us Your Boiler Inquiries

66x86 in. TRAYLOR JAW CRUSHING PLANT
Model 221 and 250 MARION SHOVELS
Nos. 4-5-6-7½-9 and 10 CRUSHERS
6 and 10-ton Gasoline Locomotives
2-DISC CRUSHERS, 36 in. SYMONS, also 24 in.
100-ton, 2½ yd. ELECTRIC SHOVEL
50—5,000 ft. steam belt and electric compressors
13x30 in.; 10x18 in.; 8x14 in. JAW CRUSHERS—also 24x36 in. Traylor
24x54, 18x30 McLANAHAN ROLL CRUSHERS
50 H. P., D. D. Hoist, 440 V., 3 phase motor, Dragline Set. Also 25 h.p. Dragline Equipment
3—60 h.p. GASOLINE HOISTS, single drum
10 and 12-ton ROAD ROLLERS
5—7½ and 10 h.p. PORTABLE CONVEYORS
750-1000 gpm. Underwriters Steam and Motor Driven Centrifugal Pumps, 220-440 V., 60 Cy., 3 Ph.
100 h.p. Portable Boiler—125-150 lbs., $600.

Ross Power Equipment Co.
Indianapolis, Ind.

FOR SALE

1—"GATES" 6 x 15 Dry Process ComPeb Mill complete with Chilled Iron Liners, mill arranged for right hand motor belt drive. Purchased September, 1920.

1—"STINE" No. 8 Special Horizontal Type Incline Plane, 6 to 8 ton capacity on 29 degree incline. Purchased February, 1921.

Equipment in EXCELLENT condition. PRICES RIGHT.

Other types of equipment also for sale.

THE STANDARD LIME & STONE CO.
524 Equitable Building Baltimore, Md.

Used Equipment

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Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½ x25′, 4x30′, 5½x50′, 6x60′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 4x40′, 5x50′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 5x4′, 3x3½′ pebble and ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 12x26″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24″, 36″ and 40″ cage mills; 3′ and 4½′, 6′ and 8′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens; Richardson automatic scales; 8′ and 10′ Emerick air separators.

Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

FOR SALE

No. 18 Universal Pulverizer. New machine. Has never been in operation. Immediate shipment. Address

Box 1707, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

Mine Cars, Rails and Locomotives

We have a number of good, serviceable, standard gauge, second hand locomotives, and narrow gauged ones, for immediate shipment.

M. K. FRANK
Frick Building Pittsburgh, Pa.

1—59-ton standard gauge American 6-wheel Switcher
1—50-ton standard gauge Shay geared locomotive
1—28-ton standard gauge Shay geared locomotive
1—10x16 in., 36 in. gauge, 4-wheel saddle tank
1—30-ton McMyler bucket-handling locomotive crane
1—14-B Bucyrus Steam Shovel, mounted on traction wheels
10—miles 30 and 35 pound relay steel rails, Canton, Mississippi.

Birmingham Rail & Locomotive Co.
Birmingham, Ala.

FOR SALE

No. 18 Universal Pulverizer—Replaced by larger machine, 90% new with 1¼-in., ¾-in., and ⅜-in. Grate Bars. Price $650 F.O.B. plant. Immediate delivery.

LEESBURG SILICA SAND COMPANY
New Castle, Pa.

FOR SALE

8—6x115 ft. Vulcan Rotary Kilns, condition A-1; unused.

Address Box 1700, care of Rock Products
542 South Dearborn St., Chicago, Illinois

For Sale—Steam Shovels

1—70 C. Bucyrus, 2½ yd. Bucket.
1—60 Marion, 2½ yd. Bucket.
Both standard gauge. Immediate shipment.

Consolidated Products Co., Inc.
15 Park Row New York, N. Y.

For Sale—STEAM SHOVEL

⅝ YD. THEW "O" TRACTION

Thoroughly rebuilt; attractive terms for quick sale.

Walter A. Zelnicker Supply Co., St. Louis
Rails, Locomotives, Cars, Tanks, Pipe

FOR SALE

4000 lin. ft., 30-in., 20 lb. Track
12 30-in., 1½-yd. Cars
PLYMOUTH GASOLINE LOCOMOTIVE

F. WILLIAM STOCKER
Hoboken, N. J.

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

Classified Advertising

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

FOR SALE

A valuable tract of land in Hellam Township, York County, Pennsylvania. Practically the whole tract is underlaid with limestone samples which have shown 98 per cent calcium carbonate.

There has been opened a quarry with a breast about 300 feet long and from 40 to 50 feet high, with floor above water level.

The property has on it three lime kilns, powder house, power line (electrical), four dwelling houses for laborers and farm buildings.

The Pennsylvania Railroad, running from York, Pennsylvania, to Philadelphia, runs along the southern boundary of property and the Lincoln Highway is about a quarter of a mile from property.

We also offer a clay tract containing approximately eleven acres of light gray clay, running to a depth of 80 to 115 feet and more.

BOX 1711, CARE OF ROCK PRODUCTS
542 South Dearborn Street Chicago, Illinois

FOR SALE

One late up-to-date Double Unit S. A. Screening Plant complete with Washers, Motors, Sub-structure, and ready to dismantle, re-assemble and operate. Nearly new. First class. A genuine bargain. For full description and detail information on prices, etc., address

W. S. Keller, Receiver, Lock Box 467
Marshalltown, Iowa

Classified Advertising

FOR SALE

Operating sand and gravel plant and property consisting of 150 acres of the very best sand and gravel land to be found anywhere. Location good for markets. Will be priced right to parties interested and ready for quick action. Write for particulars or come and make personal investigation. Address

Box 1708, Care of Rock Products
542 South Dearborn Street Chicago, Illinois

Thoroughly experienced quarryman in hard and soft stone wishes to become connected with reliable quarry proposition that is operating or with one that has merits, but needs rejuvenation. Will operate on a salary or production basis.

Address Box 1712, care Rock Products
542 South Dearborn St., Chicago, Illinois

WHITE CRYSTAL MARBLE QUARRY AND MILL FOR SALE—IDEAL MARBLE FOR STUCCO DASH

A fully developed White Crystal Marble Quarry and Mill in New York State. Quarry contains 65 acres, all marble. This quarry is exceptionally sound and uniform in color and the white crystals in it make it most desirable for Stucco Dash. The equipment is complete for both quarry and mill. Reason for selling, have many other large contracts and cannot give this one my time. Address answer,

Box 1713, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

Energetic young man, graduate mining engineer, experienced as open and underground quarry and crushing plant superintendent, desires position operating plant or connection with large organization. Permanency desired. Good references.

Box 1710, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

An Opportunity

A small lime concern with a growing business is in need of a good operating man and will make it possible for the right man to share in the business on some fair basis as soon as he has proven himself. State your qualifications fully and please do not reply unless you do so with the idea of permanency in mind.

Box 1705, Care of Rock Products
542 South Dearborn Street Chicago, Illinois

Experienced Manager

Open pit or underground quarry superintendent or manager open for employment. Fifteen years' experience. Best references. Nominal salary with share in profits produced.

Address Box 1678, care of Rock Products
542 South Dearborn Street Chicago, Illinois

Position Wanted

Young man, college graduate, with 15 years all around practical manufacturing and executive experience, including cost accounting, is looking for an opening where he can eventually become directly associated with the management of the business. The last two years he was plant manager of a small hydrated lime plant. Full information on request.

Address Box 1676, Care of Rock Products
542 South Dearborn Street Chicago, Illinois

POSITION WANTED

Competent sand and gravel plant manager familiar with modern methods desires to connect with live producer. Technically educated; married. Available immediately. Address

Box 1709, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

We need a Mechanical Engineer for the designing and developing of pulverizing machinery. Must be first class man with good training and experience. Prefer one who has had experience in cement mill machinery. Give complete data regarding training, experience, capabilities and salary in first letter. Apply

BRADLEY PULVERIZER CO.
Allentown, Pa.

Free Service to Readers of Rock Products

If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, we are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply.

RESEARCH SERVICE DEPARTMENT

ROCK PRODUCTS, 542 So. Dearborn St., Chicago, Illinois

Please send me catalogs and prices concerning the following items:

.....

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Name.....

Address.....

City..... State.....

MISSABE DIPPER

If you were to ask a user why he values the Missabe Dipper, he would undoubtedly answer: "Its dependability." It is dependable because it endures, and it endures because it is made of the toughest steel known. Send for Missabe Bulletin—contains details of construction.

Clark Reversible Dipper Teeth

The most economical and satisfactory dipper teeth on the market.

Get our exchange proposition

AMERICAN MANGANESE STEEL COMPANY

General Sales Office:
398 East 14th Street
Chicago Heights, Ill.

FOUNDRIES: Chicago Heights, Ill.; New Castle, Del., and Oakland, Calif.

AMSCO
Trade Mark

INDEX TO ADVERTISEMENTS

Acme Road Machinery Co. 82
Ajax Metal Co., The 91
Allis-Chalmers Mfg. Co. 75
American Hoist and Derrick Co. 84
American Manganese Steel Co. 96
American Process Co. Inside back cover
American Rolling Mill Co. 69
Atlas Railway Supply Co. 89
Austin-Western Road Machinery Co. 15

Bacon, Earle C., Inc. 90
Baldwin Locomotive Works 90
Browning Co. 13
Buchanan Co., C. G. 85
Buckeye Dryer Co. 85
Burke Electric Co. 92
Buyers' Directory 70-72
Byers Machine Co., The 90

Caldwell & Son, H. W. 81
Carroll Chain Co., The 90
Celite Products Co. 9
Central Frog and Switch Co. 92
Classified Advertising 94-95
Climax Engineering Co. 2
Clyde Iron Works Sales Co. 16
Colonial Steel Co. 83
Crescent Belt Fastener Co. 92
Cross Eng. Co. 73

Dings Magnetic Separator Co. 67
E. I. du Pont de Nemours & Co. 8
Ehrsam & Sons Co., J. B. 84
Ellicott Machine Corp. 89
Ensign-Bickford Co. 78
Erie Steam Shovel Co. 87

Falk Corp. 75
Fate-Root-Heath Co. 86
Fuller-Lehigh Co. 92

Gay Co., Rubert M. 82
Glamorgan Pipe and Fdy. Co. 79

Hadfield-Penfield Steel Co. 81-92
Harrington & King Perforating Co. 88
Hendrick Mfg. Co. 88
Howells Mining Drill Co. 86
Hunt, R. W., Co. 91
Hyman-Michaels Co. 88

Industrial Works 87
Interstate Equipment Corp. 91
Ironton Engine Co. 91

Jackson & Church Co. 81
Jaite Co., The Inside back cover
Jeffrey Mfg. Co. 20

K-B Pulverizer Co., Inc. 84
Keystone Lubricating Co., The 17
Knox Mfg. Co. 89
Koppel Ind. Car & Equip. Co. 77
Kritzer Co., The 82

Leschen & Sons Rope Co., A. Inside back cover
Lima Locomotive Works 76
Link-Belt Co. 14

Magnetic Mfg. Co. 91
Marion Steam Shovel Co. 10
McLanahan-Stone Machine Co. 85
McMyler Interstate Co. 12
Meade & Co., Richard K. 91
Merrick Scale Mfg. Co. 92
Milwaukee Locomotive Mfg. Co. 73
Miscampbell, H. 82
Morgan Construction Co. 79
Morgan Engineering Co. 78
Morris Machine Works 89

Newark Wire Cloth Co. 88
New Holland Mach. Co. 90
N. Y. Belting and Packing Co. 1
Northwest Engineering Co. 3

Ohio Locomotive Crane Co. 90
Orton & Steinbrenner Co. Inside front cover
Osgood Co., The 87
Ottumwa Box Car Loader Co. Inside back cover

Penn Fdy. and Mfg. Co. 90
Pennsylvania Crusher Co. 90
Pennsylvania Pump and Comp. Co. 89
Pittsburgh-Des Moines Steel Co. 71
Porter Co., H. K. 91

Raymond Bros. Impact Pulv. Co. 21
Robins Conveying Belt Co. 86

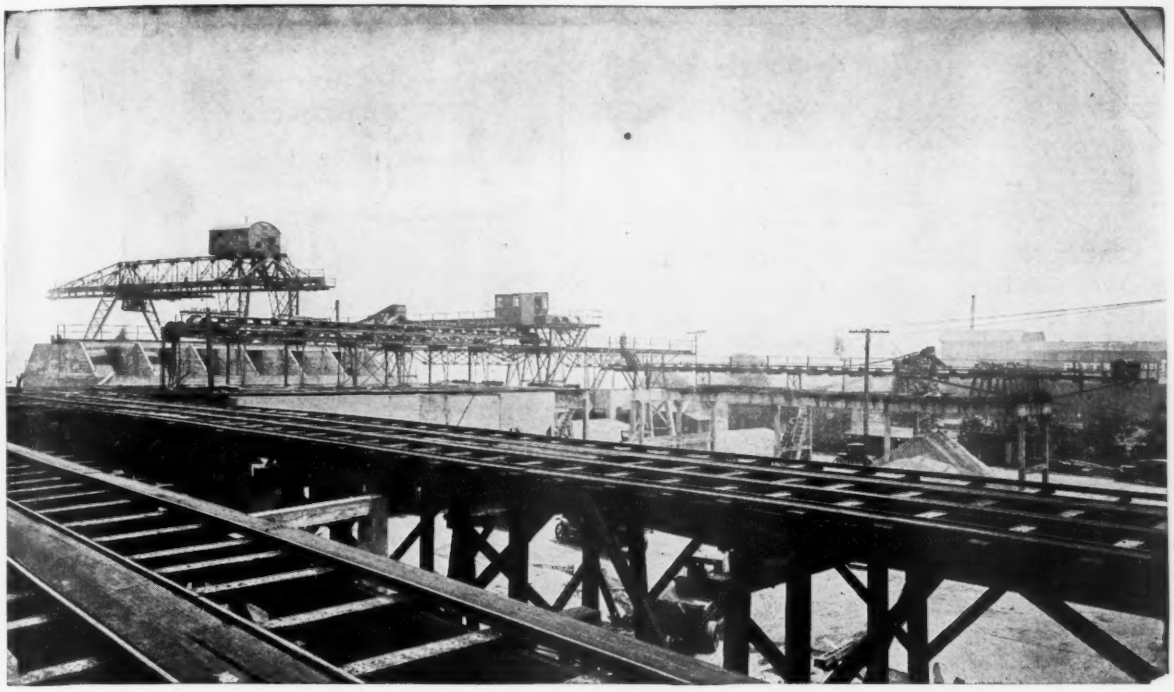
Sanderson-Cyclone Drill Co. 87
Sandvik Steel Co., Inc. Front cover
Sauerman Bros. 91
Schaffer Eng. and Equip. Co. 22
Shope Brick Co. 7
Smith Eng. Works 74
Smidth & Co., F. L. 19
Smokeless Oil Burner Co. 86
Sturtevant Mill Co. 74

Thew Shovel Co. 11
Thomas Elevator Co. 77
Toepfer & Sons Co., W. 80
Traylor Eng. and Mfg. Co. 18
Tyler Co., The W. S. 92

United Iron Works, Inc. 83
Universal Crusher Co. 84
Universal Road Machinery Co. 85
Used Equipment 93-94

Valve Bag Co. of America Back cover
Vulcan Iron Works 76

Webb City & Carterville Fdy. & Mach. Works 83
Webster Mfg. Co. 6
Weller Mfg. Co. 80
Worthington Pump and Machy. Corp. 4-5



Check Up Your Handling Costs

In many cases it will be found that handling methods, which for years have been considered economical, are expensive and slow when compared to a conveyor system.

Brownhoist belt conveyors offer a dependable method, of wide application, for the handling of sand, gravel, stone, coal, etc. Built by an organization with nearly fifty years' experience in designing handling machinery, Brownhoist conveyors can be depended upon for years of continuous and economical service.

The Brownhoist Belt conveyor system illustrated above, was recently installed at the plant of the Ohio River Sand Co. Sand is unloaded from barges into a receiving hopper by the Brownhoist bridge crane. After washing and screening it is delivered to concrete storage bins by 36-inch belt conveyors. Previous to the installation of these Brownhoist Conveyors, the sand and gravel was delivered to the bins by hand carts operating on an overhead track system, part of which can be seen in the illustration.

Let our engineers analyze your present handling methods and determine what improvements are practical. You may be surprised at the savings that are possible.

Conveyor Comments

Brownhoist idlers remain in perfect alignment throughout the life of the conveyor. Power consumption and belt wear are exceptionally low. The Brownhoist method of mounting insures uniform trough shape for every idler.

The Brown Hoisting Machinery Co., *Cleveland, Ohio*

Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans

Products: Locomotive Cranes, Buckets, Storage Bins, Belt and Chain Conveyors, Etc.

BROWNHOIST

MATERIAL HANDLING EQUIPMENT

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879.

Published Every Other Saturday by

Tradepress Publishing Corporation

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Volume 26 November 3, 1923 Number 22

CONTENTS

Iowa's Model Crushed Stone Plant 13, 14, 15
Hawkeye Quarry Co. has rebuilt plant of unusual efficiency.

Promoting a New Gypsum Mill in Utah 15
Promoters visit existing plant for facts to justify new operation.

Rotary Cutters for Sand and Gravel 16, 17, 18
Discussion of cutters used in dredging and capable of adaptation to sand and gravel plants.

Quarrying Asphaltic Rock in Texas 19, 20, 21, 22
Plant and deposit of the Uvalde Rock Asphalt Co.

New Catalina Island Crushing Plant 22, 23, 24
Graham Brothers building most spectacular quarry plant on the West Coast.

Cement Manufacturers' Protective Association at New York Dissolved 24

Big British Cement Plant 26, 27, 28, 29, 30, 31
Most modern portland cement plant in Great Britain—the Ship Canal Portland Cement Co.

Successful Concrete Brick Manufacture at Gravel Plant 32, 33, 34
Warren Sand and Gravel Co., Easton, Pa., finds profitable use for waste sand.

Rebuilding the Roche Harbor Lime Plant 35

Producing Whiting from Arkansas Chalk 36, 37, 38, 39, 40
Plant of the Krippendorf-Tuttle Co., White Cliff, makes material to compete with English whiting.

Tunnel Blasting in Quarries 48, 49
Examples of "coyote hole" shooting in Oregon quarry operation.

Unusual Cement Contract of Missouri State Highway Commission 50

Questions and Answers 41

Hints and Helps 42, 43

Quarried from Life 44

Editorial 45

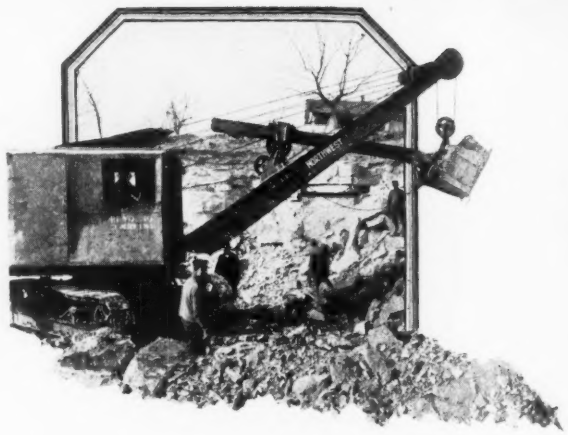
Traffic and Transportation 46, 47

General News 50, 51, 52, 53

Market Quotations 54, 55, 56, 57

New Machinery and Equipment 58, 59

News of All the Industries 60, 62



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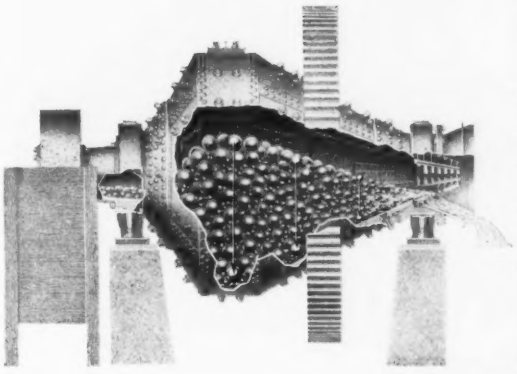

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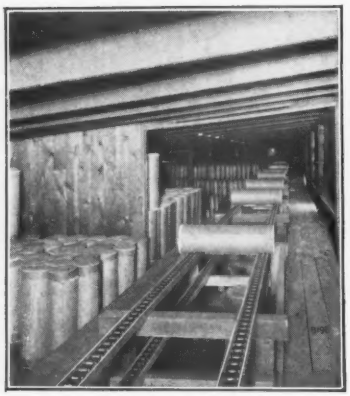

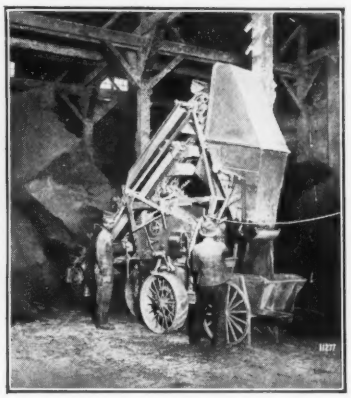

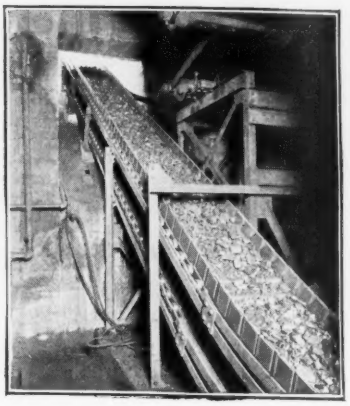

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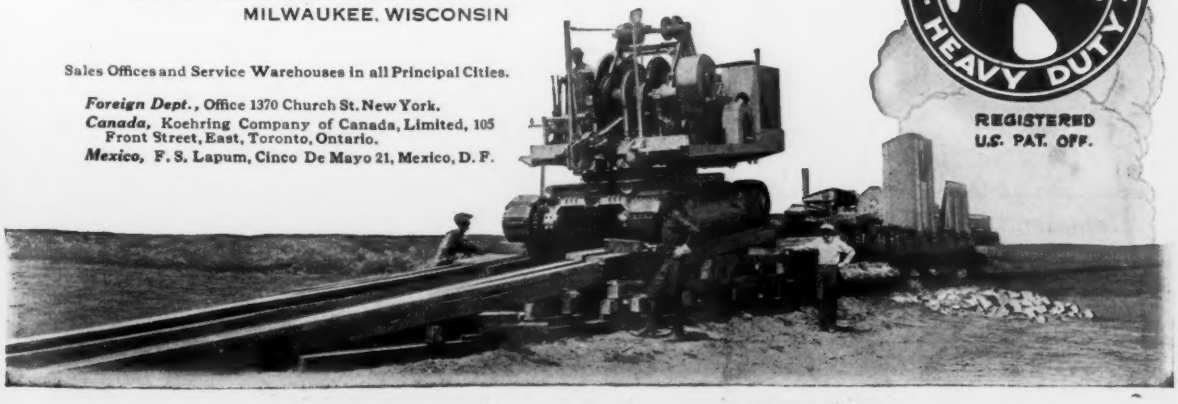

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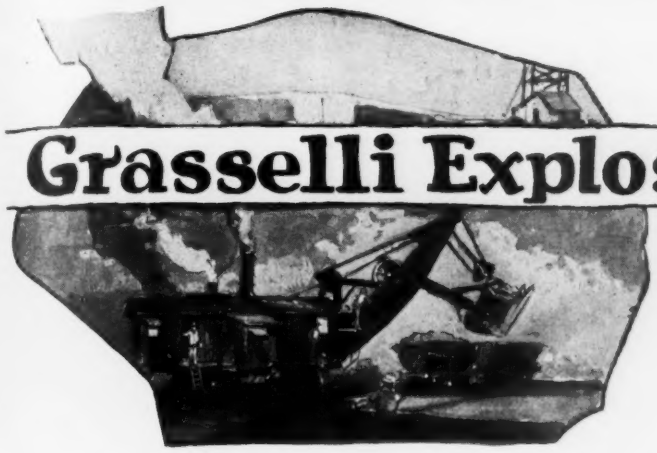

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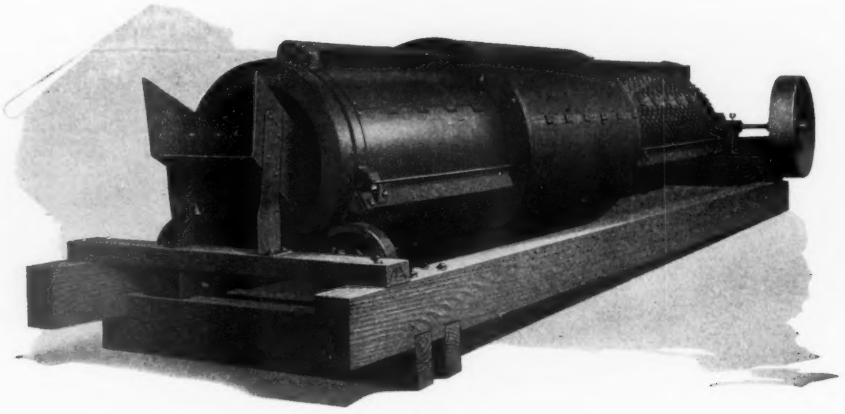

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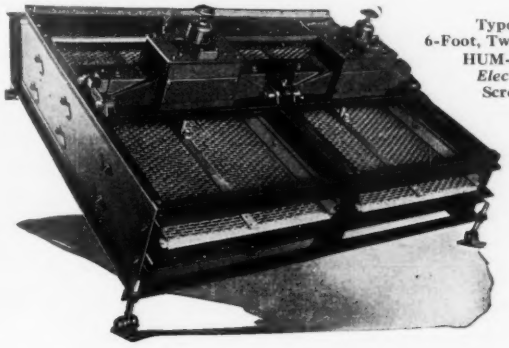

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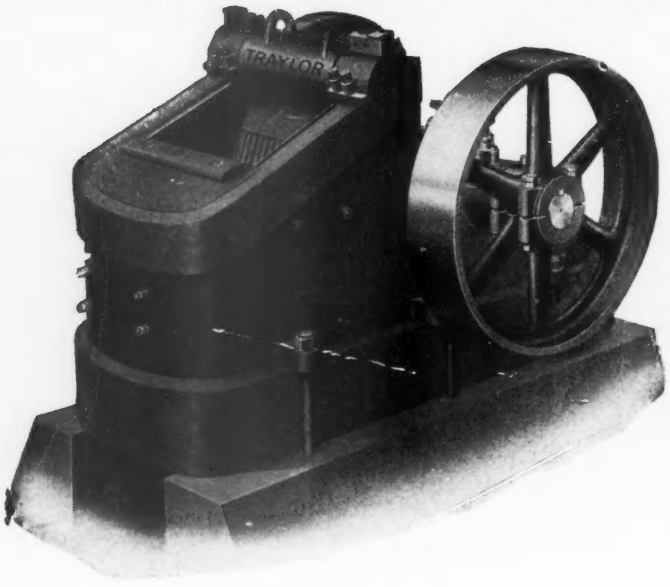

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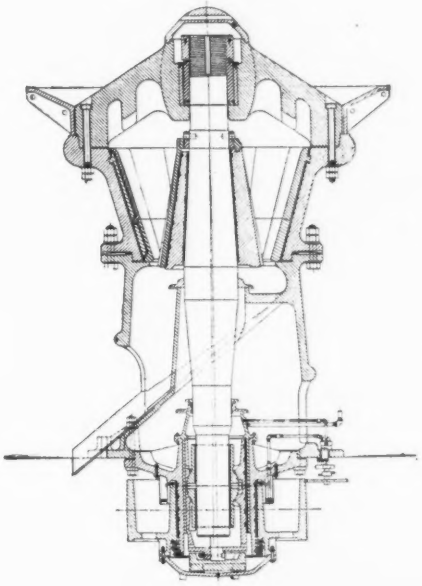

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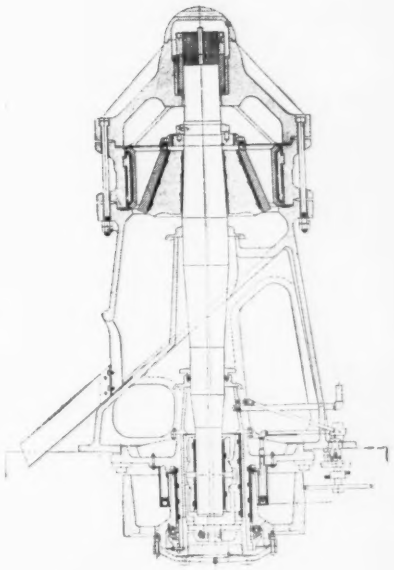

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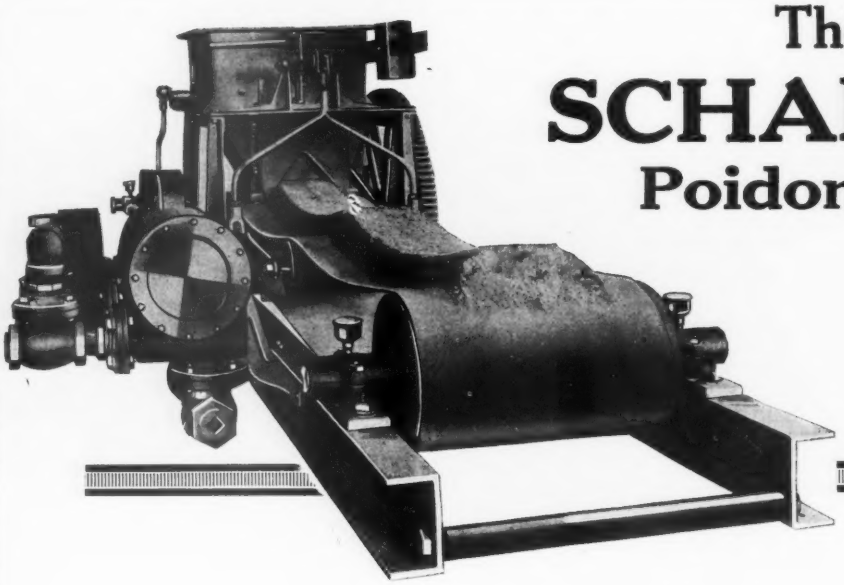

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